

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.09.1999 Bulletin 1999/36

(21) Application number: 99104176.5

(22) Date of filing: 02.03.1999

(51) Int. Cl.⁶: H04N 7/173

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

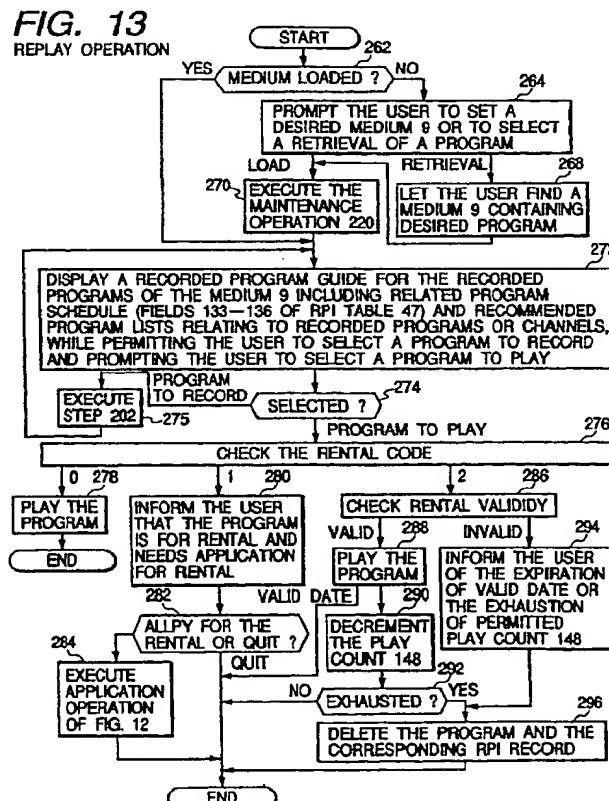
(30) Priority: 03.03.1998 JP 6603898

(71) Applicant:
MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.
Kadoma-shi, Osaka 571-8501 (JP)

(72) Inventor: Tsukidate, Ryota
Tokyo 125-0063 (JP)(74) Representative:
Manitz, Finsterwald & Partner
Postfach 22 16 11
80506 München (DE)

(54) Multimedia recorder with enhanced EPG-related functions

(57) A digital multimedia recorder that makes good use of EPG data to have at least one of the following capabilities of: (a) selecting a program to be played from a displayed program guide for recorded programs; (b) including, in the displayed program guide, program information on programs relating to each of the recorded programs thereby to permit the user to program the recorder to record a selected one of the related program; (c) recording a plurality of programs broadcast at the same time; (d) record a multi-channel program whose channel configuration changes in the middle of the program so as to support the capability (a); and (e) playing a recorded program within a limit prescribed in a contract with a provider. The information includes information on related programs, if any (which are related with each program), and information on recommended programs which a broadcasting party recommends to the subscribers.



Description**BACKGROUND OF THE INVENTION**

5 1. Field of the Invention

[0001] The invention generally relates to a broadcasting system and more particularly to a multimedia recorder with recorded program management functions based on EPG data, a TV receiver provided with such a recorder, and a system for supporting such functions in a broadcasting equipment.

10 2. Description of the Prior Art

[0002] Generally, in digital broadcasting systems, at least one broadcasting station broadcasts a transport stream (TS) defined in MPEG-2 (Moving Picture Experts Group II) standard. The transport stream (or a physical channel) includes a plurality of (logical) channels in a time-division-multiplexed form. Each logical channel includes many programs. Each program comprises at least one video subchannel, at least one audio subchannel and/or at least one data subchannel. Program specific information (PSI) and service information (SI) on each program are frequently inserted in the TS.

[0003] Such digital broadcasting systems usually provide far many channels as compared with analog broadcasting systems and accordingly an enormous number of programs. This makes channel or program selection difficult. In order to facilitate program selection, information on programs is transmitted as EPG (Electronic Program Guide) enabling the subscribers to select a program to watch and to program a VCR (video cassette recorder) to record a desired program by displaying a program schedule and selecting the desired program through a remote controller.

[0004] If one of the recorded programs is to be played in conventional video recorder such as a VCR, then the user often takes a lot of time to find a desired one of recorded programs recorded on recording medium. The user may even forget the programs he or she recorded in a recording medium. In this case, the user has to search the recording media to see what programs are recorded on the recording media if he or she has not made notes at the recording times.

SUMMARY OF THE INVENTION

[0005] The invention is directed to solving this and other problems and disadvantages of the prior art. It is an object of the invention to provide a digital multimedia recorder that makes good use of EPG data to have at least one of the following capabilities of:

- 35 (a) selecting a program to be played from a displayed program guide for recorded programs;
- (b) including, in the displayed program guide, program information on programs relating to each of the recorded programs thereby to permit the user to program the recorder to record a selected one of the related program;
- (c) recording a plurality of programs broadcast at the same time;
- (d) record a multi-channel program whose channel configuration changes in the middle of the program so as to support the capability (a); and
- (e) playing a recorded program within a limit prescribed in a contract with a provider.

[0006] Generally, information on programs such as EPG is referred to as "program information." Hereinafter, it is assumed that the program information includes information necessary for extracting a desired program from the received TS's, information on each program, information on related programs, if any (which are related with each program), and information on recommended programs which a broadcasting party recommends to the subscribers.

[0007] According to one aspect of the invention, a method of managing recorded programs recorded in a recording medium in a broadcasting system is provided. The broadcasting system comprises at least one transmitter and a plurality of terminals. Each transmitter broadcasts a data stream. A plurality of channels is multiplexed into each data stream. Each channel comprises a plurality of programs. Each transmitter includes, in the data stream, program information on the programs available in the broadcasting system. Each terminal permits a user to select a desired one of the programs; adds the selected program to a recording queue which keeps program-identifying data sets in order of broadcast start time; records on the recording medium a program identified by one of the program-identifying data sets in a first position of the recording queue; records a program information record of the recorded program in a predetermined area on the recording medium; in response to a reception of a playing request from the user; displays a program guide for the recorded programs recorded on the recording medium; prompts the user to select one of said recorded programs for play; in response to the user selecting one of the recorded programs, plays the selected recorded program to provide video and/or audio output(s).

5 [0008] According to another aspect of the invention, a multimedia reproducer for reproducing recorded programs recorded on a recording medium is provided. Program information comprising program information (PI) records associated with said recorded programs is also recorded on the recording medium. The multimedia reproducer comprises: means, responsive to a reception of a reproducing request from the user, for displaying a program guide for the recorded programs and prompting the user to select one of the recorded programs for play; and means, responsive to the user selecting one of the recorded programs, for reproducing the selected recorded program.

BRIEF DESCRIPTION OF THE DRAWING

10 [0009] The features and advantages of the present invention will be apparent from the following description of an exemplary embodiment of the invention and the accompanying drawing, in which:

15 FIG. 1 is a diagram showing an exemplary arrangement of a digital multimedia broadcasting system 100 according to the principles of the invention;
 FIG. 2 is a schematic block diagram showing an arrangement of an illustrative embodiment of a digital multimedia disc recorder which is according to the invention and which is used as the recorder 5 of FIG. 1;
 FIG. 3 is a diagram showing an exemplary manner of creating a program information table 32 stored in the storage device 20;
 FIG. 4 is a diagram showing two exemplary records 32r of the PI table 32t.
 20 FIG. 5 is a diagram showing an exemplary structure of a recommended program list according to the principles of the invention;
 FIG. 6 is a flowchart showing an recording operation executed by the controller 19 in response to the user pressing a request button for programmed recording;
 FIG. 7 is a diagram showing the contents of the recording queue 45;
 25 FIG. 8 is a diagram showing an exemplary structure of a recorded program information record 47 of a recorded program which record is recorded in a predetermined location of the recording medium 9 and which is stored in the recorded program information table 47 stored in the storage device 20;
 FIG. 9 is a diagram showing an exemplary RPI (recorded program information) recorded on the recording medium 9 according to the invention;
 30 FIG. 10 is a flowchart showing a exemplary label printing operation executed in response to a printing request from the user;
 FIG. 11 is a flowchart showing an RPI table maintenance operation executed in response to a loading the TS recorder 13 with a recording medium 9;
 FIG. 12 is a diagram for describing an exemplary video rental data registration operation according to the invention;
 35 FIG. 13 is a flowchart showing a exemplary playing operation executed by the controller in response to a pressing of a play button of the man-machine interface 21 in accordance with the principles of the invention;
 FIG. 14 is a schematic block diagram showing an arrangement of an illustrative embodiment of a digital multimedia tape recorder which is according to the invention and which is used as the recorder 5 of FIG. 1;
 FIG. 15 is a diagram conceptually showing an example of a transport stream to be recorded;
 40 FIG. 16 is a flowchart showing a periodically executed operation of adjusting the frequency of the PI's inserted in the recorded TS in recording operation;
 FIG. 17 is a diagram conceptually showing another example of a transport stream to be recorded;
 FIG. 18 is a diagram showing steps 371 and 372 which is used in place of step 272 in playing operation of a tape recorder 5a of FIG. 14;
 45 FIG. 19 is a schematic block diagram showing a simplified version of the digital multimedia disc recorder of FIG. 2; and
 FIG. 20 is a schematic block diagram showing an arrangement of an illustrative embodiment of a digital multimedia player according to the principles of the invention.

50 [0010] Throughout the drawing, the same elements when shown in more than one figure are designated by the same reference numerals.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

55 [0011] FIG. 1 is a diagram showing an exemplary arrangement of a digital multimedia broadcasting system 100 according to the principles of the invention. In FIG. 1, the digital multimedia broadcasting system 100 comprises at least one broadcasting transmitter 1, a transmission medium 2 and a multiplicity of receiver terminals 5 such as a digital multimedia recorder, a digital TV with a recording capability, and any other terminal with digital broadcast receiving and

recording capabilities. The broadcasting station 1 preferably transmits, through the transmission medium 2, a modulated signal of a transport stream (TS) defined in the MPEG-2 standard. The transmission medium may be any of a satellite, the terrestrial air and cables. The digital multimedia broadcasting system 100 may optionally include one or more video rental center 3, which comprises a computer 30 and a telephone line interface (IF) 31 for permitting the computer 30 to communicate with the terminal 5 through a public switched telephone network 4. The center 3 computer 30 creates and stores a record of a rented video title, information on a customer, and the term of validity or the number of permitted plays for the title in response to a rental request from a terminal 5, and informs the terminal 5 of the term of validity or the remaining number of permitted plays in response to a request for playing a rented video title.

[0012] FIG. 2 is a schematic block diagram showing an arrangement of an illustrative embodiment of a digital multimedia disc recorder which is according to the invention and which is used as the recorder 5 of FIG. 1. In FIG. 2 the disc recorder 5 comprises a tuner 10 for receiving a plurality of broadcast signals from the broadcasting stations 1; a TS processor (M→N) 11 having its input connected with a tuner 10 output; a TS packetizer 12 having its input connected with a TS processor 11 output; a TS disc recorder 13 having its recording input connected with a TS packetizer 12 output; a one-of two selector 14 having its two inputs connected with a TS disc recorder 13 output and a node between the TS processor 11 output and the TS packetizer 12 input; a TS processor 15 having its input connected with a selector 14 output; a video and audio decoder 16 having its input connected with a TS processor 15 output; an NTSC/PAL encoder 17 having its input connected with a decoder 16 video output; and a digital-to-analog converter (DAC) 18 having its input connected with a decoder 16 audio output.

[0013] The digital multimedia disc recorder 5 further comprises a controller 19 that includes a storage device 20; a man-machine interface 21 for enabling the user to control the recorder 5; a telephone interface 22 connected with the PSTN 4; a label printer 23; and a bus 24 for enabling communications among the elements 10 through 16 and 18 through 23. The man-machine interface 21 includes a remote controller.

[0014] The TS recorder 13 of the disc recorder 5 is adapted for a removable disc storage medium 9, e.g., an optical disc, a magnetic disc cartridge, etc. As for information of each of broadcast programs recorded in a recording medium 9, the disc recorder 5 preferably not only keeps it in the storage device 20 as long as the program is being stored in the recording medium 9 but also records it at a predetermined location of the recording medium 9. This permits the recording medium 9 to be played in other disc recorder 5 of the same kind. For this purpose, the TS recorder 13 records TS's on a recording medium 9 such that the recording medium 9 has a program information area of a predetermined size at a predetermined location.

[0015] As seen from just above paragraph, the storage device 9 is preferably a nonvolatile memory or a battery backed-up RAM (random access memory).

[0016] FIG. 3 is a diagram showing an exemplary manner of creating a program information table 32 stored in the storage device 20. Referring to FIGs. 2 and 3, the operation of the multimedia disc recorder 5 will be described in the following. The broadcast signals (physical channels) from the broadcasting stations 1 are received by the tuner 10. The tuner 10 selectively demodulates one of the received broadcast signals (which include respective transport streams TS1, TS2,...) into a transport stream TSi (i: a TS number) according to a TS selection instruction from the controller 19. It is assumed that a transport stream TSi includes M logical channels in a well-known time-division-multiplexed manner. The TS processor 11 supplies, to the TS packetizer 12, packets for N logical channels selected according to a channel selection instruction from the controller 19, where M is the number of logical channels 1 in the selected transport stream TSi, and N is the number of selected logical channels. So, N ≤ M.

[0017] (In this document, the terms "physical channel" and "logical channel" mean a TS and a channel included in a TS, respectively. If the term "channel" is simply used, it means "logical channel".)

[0018] The TS processor 11 outputs program information (PI) 31 on the bus 24 in response to a PI request from the controller 19. The program information 31 obtained from the schedule EIT (Event Information Table defined in the DVB (Digital Video Broadcasting)) of TSi includes basic PI for all the programs provided through all the available channels CH1, CH2,...,CH100 (it is assumed that 100 (logical) channels are available in this specific broadcasting system 100) and detailed PI for the programs provided through the M logical channels in TSi.

[0019] The controller 19 updates the program information table 32 by using the program information from the TS processor 11. Each record of the program information table has a structure 32 as shown in FIG. 3. Specifically, each record comprises a program serial number 131 the recorder 5 assigns uniquely to each program when program information for the program is received for the first time, a channel ID 132 unique to the channel, a title 133 of the program, broadcast time and date 134, a subtitle 135, a broadcast count in a serial 136 which is optionally used for programs in serial form, a category code 137 that contains a category code indicative of the category of the program, time period 138 during which a channel configuration of the program is valid, a channel configuration 139 which indicates channels constituting the program during the corresponding time period 138, further details 140 on the program, and label information 141 (detailed later). Each record of the program information table 32 further includes a rental code 142 indicative of rental conditions of the program and a center phone number 143 (in case of a program for rental) in order to enable rental video business through the digital broadcasting system 100 in a manner as detailed later. It is noted that the storage

device 20 stores a category table (not shown) that associates category codes with corresponding category name.

[0020] The program serial number 131 is expressed in such a limited number of digits as can be used for sufficiently larger number. When the number 131 reaches a possible maximum number, the number 131 is set to, e.g., one at the time of registration of the next program.

5 [0021] The fields with the left side drawn in a double line in FIG. 3 can have multiple values as shown in FIG. 4. FIG. 4 is a diagram showing two exemplary records 32r of the PI table 32t.

[0022] In FIG. 4, the record "100123" for a program which is titled "Dora the vagrant" and which is to be broadcast from 20:00 to 20:54 on 6/2/1999 has three additional values for each of the fields 134 through 136. Doing this enable a program information for one program to inform the subscribers of the subsequent three broadcasts (i.e., the fourth, fifth and sixth broadcasts of 15 serialized programs in this example) of the serial "Dora the vagrant." The title fields 133 for the additional program information has no values because the additional information is for serialized programs. However, program information for any related programs of different types may be included in each record by containing a title in the title field 133.

[0023] On the other hand, the record 100234 for a program which is titled "NFL 99: The Super bowl" and which is to be broadcast from 18:00 to 20:59 on 6/2/1999 has one additional value for each of the fields 138 and 139. This means that the channel configuration of the program No. 100234 changes once in the middle of the period from 18:00 to 20:59. Specifically, the program 100234 is broadcast through three video channels and three audio channels for the first 120 minutes from the beginning (i.e., for a period from 18:00 to 19:59) and then through three video channels and four audio channels for the subsequent 60 minutes (i.e., for a period from 18:00 to 18:59). This enables the subscribers to select 15 a desired combination of video and audio channels for a multi-channel program (which means a program which is broadcast through more than one optional channels for video, audio or each of video and audio in this document).

20 [0024] In this example, a period for which a certain channel configuration is defined is expressed in terms of relative start and end times from the beginning of the program. However, the period may be identified by a start value and an end values expressed in terms of relative positions from the beginning of the program on the recording medium.

25 [0025] Though in just described example a multi-channel program is comprised of a video channel and an audio channel, a program may include a data channel. It should be noted that a program may be comprised of only one or more data channel.

[0026] A broadcasting party is also permitted to include a recommended program list associated with a logical channel or a program in a table, which we have defined and we call "Event Collection Table" or "ECT". FIG. 5 is a diagram 30 showing an exemplary structure of a recommended program list 40. The recommended program list 40 comprises a list title 41, a valid period 42 of the list 41 and at least one record comprising the channel ID 132 and the broadcast time and date 134. Since the combination of the channel ID 132 and the broadcast time and date 134 is used for identifying 35 a program record associated with the channel ID 132 and the broadcast time and date 134, information contained in any fields of the record of the program identified by the channel ID 132 and the broadcast time and date 134 can be displayed.

[0027] It is noted that the broadcasting party is permitted to set a valid period to the list 40. When the recommended program list 40 is displayed at 9:00 on 9 February 1998, only the programs that begins after 9:00 on 9 February 1998 are displayed, i.e., only the second and subsequent programs of the list whose valid period includes the time 9:00 and the date 9 February 1998 are displayed.

40 [0028] When the broadcasting of a program has been completed, the controller 19 deletes not only the record for the just broadcast program from the program information table 32 but also recommended program lists 40, if any, that contain the channel and program IDs for the just broadcast program as the program to be last broadcast in the list.

Recording Operation

45 [0029] FIG. 6 is a flowchart showing an recording operation executed by the controller 19 in response to the user pressing a request button for programmed recording. In step 201, the controller 19 first displays a program guide table based on the program information table 32 and lets the user select one of the displayed programs. It should be noted that the user is permitted to select a desired number of channels for any identical time period as long as the channels 50 are of an identical TS, e.g., even all the logical channels in a physical channel.

[0030] In step 202, the controller 19 adds a data set (i.e., the values of the channel ID field 132 and the broadcast time & date field 134) of the selected program to a recording queue 45 of FIG. 7. The data sets are preferably arranged in order of broadcast start time in the recording queue.

55 [0031] In step 203, a test is made to see if it is time to record. This step is repeated until it becomes a recording time of an earliest program in the queue 45. If the time is reached in step 203, the controller 19 records the earliest program in the queue 45 by informing the tuner 10 and the TS processor 11 of the transport stream and the channel IDs to receive and sending suitable instructions to the TS packetizer 12 and the TS recoder 13 in step 204. Alternatively, if the user operates the controller or the man-machine interface 21 in a predetermined manner to record the receiving pro-

gram, the controller 19 also records the receiving program by simply sending the suitable instructions to the TS packetizer 12 and the TS recorder 13 in step 204. In either case, the TS packetizer 12 packetizes the received packet stream (PES (Packetized Elementary stream) packets in the MPEG-2 standard) into a TS packet stream, which is then recorded by the TS recorder 13 in the recording medium 9.

5 [0032] On completing the recording of the program, in step 205, the controller 19 adds a record to the recorded program information table 47 as shown in FIG. 8; stores values in the medium ID field 146 and the recording location field 147; copies the fields 132 - 143 from the table 32 to the table 47; and deletes the copied record from the table 32. A recorded program serial number is assigned by the controller 19 to each of the recorded programs in the recorded order. The controller 19 also assigns a medium (or volume) ID to each of the recording media 9 on which the recorder 10 has recorded any program even once.

[0033] In step 206, the controller 19 makes a test to see if the recorded program is the first one for the recording medium 9. If so, a digital multimedia recorder 5 ID stored in, e.g., a not-shown ROM (read only memory) within the controller 19 is recorded in a predetermined location on the recording medium 9 in step 207. Otherwise, the controller is passed to step 208.

15 [0034] In step 208, the controller 109 records the added recorded in the recorded program information table 47 and a recommended-program list 40, if any, for the program in the predetermined location of the recording medium 9. In step 209, the controller 10 makes a test to see if the queue is empty. If so, the controller 19 ends the operation. Otherwise, the controller 19 returns to step 203.

20 [0035] In this way, a specified program and recorded program information (RPI) for the program are recorded on the recording medium 9 as shown in FIG. 9. This enables a recording medium 9 recorded by one recorder 5 to be played in other recorder 5 of the same kind.

[0036] If the RPI for all of the programs recorded by the recorder 5 is stored in the storage device 20, then using any suitable database management system and including key words in each RPI record of the table 47 facilitates the management of the recorded programs such as the retrieval of recorded program.

25 [0037] Turning now to FIG. 2, in recording operation, the switch 14 is kept to b-side. It is noted that the user is permitted to select one of the M logical channels of the received TSi for watching as well as above-mentioned N channels for recording. In this case, the controller 19 controls the TS processor 15 to supply the selected channel for watching to the video & audio decoder 16. Printing a Label

30 [0038] According to the principles of the invention, the broadcasting transmitter 1 preferably includes label information 141 in the program information for programs for rental. The label information 141 of a program includes texts on the program and one or more icons. The label information may be printed on a label or seal, which is stuck on the recording medium on which the program has been recorded. Alternatively, The label information may be printed directly on the recording medium. FIG. 10 is a flowchart showing a exemplary label printing operation executed in response to a printing request from the user. In step 211, a test is made to see if a medium 9 is loaded in the TS recorder 13. If so, the controller 19 displays program information of the program recorded on the medium 9 in step 212 and asks the user in step 213 if the medium is a correct one. If not, or if the test result is NO in step 211, the controller 19 prompt the user to load the TS recorder 13 with a desired medium 9 in step 214 and returns to step 211.

35 [0039] If the test result is YES in step 213, the controller 19 displays label information 141 including a list of printable items in step 215, prompts the user to select desired items in step 216, and asks the user if it is OK. If not, the control 40 is returned to step 216. If it is OK in step 217, the controller 19 pass the data the user selected to the label printer 218 to print as specified by the user in step 218, and ends the operation.

RPI Table Maintenance Operation

45 [0040] FIG. 11 is a flowchart showing an RPI table maintenance operation executed in response to a loading the TS recorder 13 with a recording medium 9. If the user inserts a recording medium 9 into the TS recorder 13, the controller 19 starts the operation of FIG. 11. In step 222, the controller 19 makes a test to see if the recorder ID stored in the medium 9 coincides with that of stored in the above-mentioned ROM (not shown) within the controller 19. If not, then the controller 19 simply copies the RPI records 47 and the recommended program lists from the media 9 to a reserved space in the storage device 20 in step 232, and ends the operation. Thereafter, the copied data is used in subsequent operation.

50 [0041] If the test result is YES in step 222, then the controller 19 makes another test in step 224 to see if there are any programs that have been deleted (by other recorder 5). If any, the controller 19 deletes the RPI records for the deleted programs from the RPI table 47 in step 226, and makes further test in step 228 to see if there are any programs that have been added (by other recorder 5). If so, the controller 19 copies the RPI records for the added programs from the medium 9 to the RPI table 47 in step 230, and ends the operation. If the test result is NO in step 228, the controller 19 simply ends the operation.

[0042] This operation causes the RPI table 47 to reflect the contents of the recording media 9 that have been used in

the digital multimedia recorder 5.

Application for a Video Rental

5 [0043] According to the principles of the invention, some of the programs are for rental. Information on whether a program is for rental or not is displayed when the program guide for the program is displayed according to the rental code 142 of the RPI record for the program. The rental code 142 indicates the state of the program with respect to video rental as shown in the table below.

10

Table

15

rental code	0	1	2
state	not for rental	for rental	
		yet applied	applied for rental

If the user finds from the program guide that a program is for rental, he or she may desire to rent the program. In order to apply for a rental of the program, the user presses a predetermined rental button of the man-machine IF 21 while selecting a desired program. Responsively, a video rental data registration operation of FIG. 12 is started. In FIG. 12, the controller 19 places a call to a video rental center 3 using the center phone number 143 contained in the RPI record for the program in step 240. In response to a reception of the call, the computer 30 of the video rental center 3 sends default and optional data to the recorder 5 in step 242. Responsively, the controller 19 displays the received data and prompts the user to select a desired limit value in step 244. In step 246, the controller 19 sends the selected value and a credit card number of the user to the center 3. In step 248, the controller 19 sets the rental code 142 to 2, and sets the permitted play count 148 or the expiration date 149 based on the selected limit value, and then ends the operation. Also, the center 3 computer 30 charges to the user's account in step 250 and ends the operation.

Operation of Playing or Reproducing a Recorded Program

30 [0044] FIG. 13 is a flowchart showing an exemplary playing (or reproducing) operation executed by the controller in response to a pressing of a play button of the man-machine interface 21 in accordance with the principles of the invention. In FIG. 12, the controller 19 makes a test in step 262 to see if the TS recorder 13 is loaded with a recording medium 9. If not, the controller prompts the user to set a desired medium 9 or to select a retrieval of a program in step 264. If 35 the user has selected the retrieval, the controller 19 lets him or her find a recording medium 9 containing his or her desired program in step 268. If a seeking recording medium 9 is found, it will be loaded into the TS recorder 13.

[0045] If the user loads the TS recorder 13 after step 264 or 268, the controller 19 executes the RPI table 47 maintenance operation 220 in step 270. In step 272, the controller displays a recorded program guide for the recorded programs of the medium 9 including related program schedule (from fields 133-136 of RPI table 47) and recommended 40 program lists relating to recorded programs or channels, while permitting the user to select a program to record and prompting the user to select a program to play or reproduce. In this case, each recommended program list may include various information that can be obtained from the program information table 32 by using the channel ID 132 and the broadcast time & date 134. In step 274, the user can select either a program to record or a program to play.

[0046] If the user selects a program to play in step 274, the controller 19 executes step 202 of FIG. 6 and returns to 45 step 272.

[0047] If the user selects a program to play in step 274, the controller 19 checks the rental code 142 in step 276. It should be noted that selecting a program includes selecting channels from the available subchannels for the program. The available subchannels are obtained from the fields 139 of the program information table 32 or the RPI table 47.

[0048] If the rental code is zero, meaning that the program is not for rental, i.e., an ordinary broadcast program, then 50 the controller 19 simply plays the program in step 278. Specifically, the controller 19 sets the switch 14 to the a side so as to connect the TS recorder 13 output with the TS processor 15 input, and controls the TS processor 15 to supply packets for the channel selected in step 274 to the video and audio decoder 16, the outputs from which are converted into such signals as are adapted to a television (TV). The programs reproduced from the recording media 9 can be supplied to external TV's and video recorders.

[0049] If the rental code is one, meaning that the program is for rent and has to be registered for rent, then the controller 19 informs the user to the effect in step 280, and asks the user in step 282 if the user desires either to apply for the rental of the program or to quit simply. In the latter case, the controller 19 ends the operation. In the former case, the controller 19 executes the application operation of FIG. 12, and ends the operation.

[0050] If the rental code is two, meaning that the program is for rent and has been registered for rent, then the controller 19 makes a test to see if the registered condition is still valid referring to the permitted play count 148 and the expiration date 149 in step 286. If so, the controller 19 plays the selected program in step 288. If the expiration date 149 field had a valid value in step 286, the controller 19 ends the operation. If the permitted play count field 148 had a nonzero value in step 286, then the controller 19 decrements the value of the field 148 in step 290. If the count 148 has become zero in step 292, the controller 19 deletes the played program (from the medium 9) and the corresponding RPI record both from the medium 9 and the RPI table 47 in step 296. If the permitted play count 148 is still valid in step 292, the controller 19 ends the operation.

[0051] If the registered condition is invalid in step 286, the controller 19 informs the user of the expiration of valid date 149 or the exhaustion of permitted play count 148 in step 294, and deletes the played program (from the medium 9) and the corresponding RPI record both from the medium 9 and the RPI table 47 in step 296.

[0052] It is noted that at the end of this operation, the controller 19 may execute a step like step 272. In this case, the controller 19 displays a program guide based on the program information table 32 instead of the RPI table 47 prompting the user to select a program to record without prompting the user to select a program to play.

[0053] According to the present invention, if the user desires to play a recording medium 9, he or she can select a program from the program guide displayed for the recorded programs of the recording medium 9.

[0054] In step 286, the validity has been checked by using the fields 148 and 149. Instead of doing this, the validity may be checked by referring to the center 3 for the validity of the program.

[0055] Also, a rental video business can be carried out through a broadcasting system according to the invention. Alternatively, a video software vending business may be carried out through the broadcasting system according to the invention as described later.

[0056] It is noted that the recorder 5 may be configured such that if the user performs a predetermined operation during the above-described step 278 or 288, the controller 19 displays a recorded program guide for the program being reproduced including related program schedules and recommended program lists relating to the program or the channel being reproduced, while permitting the user to select one of the programs included in the displayed program schedules and the recommended program lists for recording. In response to the program selection by the user, the controller 19 adds the selected program to the above-mentioned queue.

Digital Multimedia Tape Recorder

[0057] FIG. 14 is a schematic block diagram showing an arrangement of an illustrative embodiment of a digital multimedia tape recorder 5a which is used as the recorder 5 of FIG. 1. The tape recorder 5a of FIG. 14 is identical to the disc recorder 5 of FIG. 2 except that the TS processor 11, the TS packetizer 12, the TS disc recorder 13, and the controller 19 have been replaced with the TS processor 11a, TS packetizer 12a, a TS tape recorder 13a and the controller 19a. Only the differences are described in the following.

[0058] In recording operation, the TS processor 11a supplies not only packets of programs specified by the controller 19a but also program information for the programs to the TS packetizer 12a. The TS packetizer multiplexes the received packets and the program information into a TS packet stream as shown in FIG. 15. In FIG. 15, slashed parts indicate program information.

[0059] Doing this enables a program guide to be displayed by first forwarding or winding back the tape 9a to a location where the program information is recorded when the user issues a play command. For this purpose, the program information is preferably recorded more frequently. However, there is a limitation on the recording rate of program information (PI). Specifically, the maximum recording rate has to be equal to or greater than the average media MR rate plus the average program information rate. For this reason, the frequency of PI's is periodically adjusted as shown in FIG. 16. In FIG. 16, the controller 19a obtains the media bit rate MR from the TS processor 11a in step 302. A test is made in step 304 to see if the media bit rate MR is sufficiently larger than a required rate. If so, the PI insertion frequency is increased. Otherwise, the PI insertion frequency is decreased.

[0060] However, if a plurality of programs of different time periods are recorded in a single tape media, each recorded PI does not necessarily include program information for all the programs recorded on the medium 9a. For this, it is preferable to reserve a predetermined area of the tape, e.g., a head portion of the tape for recording PI for all the recorded programs and to record only a medium ID 146 in a predetermined location of the reserved area. It should be noted that the recording operation is preferably performed according to FIG. 6. In this case, step 208 is omitted. Instead of omitting the step 208, it is preferable to copy all of the RPI records with the same medium ID as the medium being used to the reserved area when the reserved area is accessed (e.g., when the tape is rewound to the beginning of the tape 9a).

[0061] Instead of recording PI together with program data, only the medium ID of the medium 9a is preferably multiplexed with the media data as shown in FIG. 17. In this case, the frequency of medium ID insertion can be much increased as compared with PI insertion. In this case, the playing operation is preferably executed according to the flowchart of FIG. 13. However, step 272 is replaced with steps shown in FIG. 18. Specifically, after step 262 or 270, the con-

troller 19a obtains the medium ID 146 from the recording medium 9a by first winding in either direction to find the medium ID 146 in step 371. In step 372 the controller 19a displays a program guide for the recorded programs of the tape 9a from the RPI table 47 in the storage device 20; and prompts the user to select a program. Then, the controller 19a proceeds to step 274 of FIG. 13. This enables a program guide of the recorded programs to be promptly displayed by a small quantity of winding or rewinding in response to a play or reproduction request from the user.

[0062] The TS processor 15 of FIG. 2 may be omitted as shown in FIG. 19. In FIG. 19, a controller 19b sets the switch 14 to the b-side during recording operation and to the a side during playing operation. Though the multimedia recorder 5 (FIG. 2) and 5a (FIG. 14) permits simultaneous recording and playing, the multimedia recorder 5b of FIG. 19 does not. It is apparent to those skilled in the art that the same simplification may be applied to the recorder 5a of FIG. 14.

[0063] In the above-described embodiments, the broadcasting transmitter 1 has optionally broadcast the values of TITLE 133, TIME & DATE 134, SUBTITLE 135, and COUNT IN A SERIAL 136 fields for a related program (FIGs. 3 and 4), and the values of CHANNEL ID 132 and TIME & DATE 134 fields for a recommended program (FIG. 5). However, transmitting these data causes the transmission and storage efficiencies to be lowered. In order to raise the transmission and storage efficiencies, the broadcasting transmitter 1 may transmit only a channel ID 132 (e.g., the service ID) and a not-shown program ID (e.g., the event ID) unique in the channel as a related program or a recommended program. The multimedia recorder 5 can use the channel ID 132 and the not-shown program ID to access a program information record in the PI table 32 associated with the two IDs. Doing this enhances the transmission efficiency and the storage efficiency. However, this technique is only valid for programs the program information of which has been transmitted to the recorder 5. For this reason, it is preferable for the broadcast transmitter 1 to transmit the two IDs for a related or recommended program whose program information has been already broadcast and to transmit the above-mentioned field (133-136 or 132-134) values for a related or recommended program whose program information has not yet been broadcast.

[0064] Also, though the above-described embodiments have identified a program information record by using the channel ID 132 and the broadcast time & date 134 of the program, a program information record may be identified by using the channel ID 132 and the program ID.

[0065] In the above-described embodiments, the values of the time period fields 138 has been described as transmitted from the transmitter 1. Alternatively, the TS processor 11 may monitor the channel configuration of each program. In this case, if the TS processor 11 detects a change in the channel configuration of a program, then the TS processor 11 stores the start and end times of the channel configuration before the detected change which times are measured from the beginning of the program.

[0066] In the above-described embodiments, the numeral 3 has been described as a video rental center. However, the video rental center 3 may be replaced with a video software vendor's center. In this case, the RENTAL CODE field 142 is read as a purchase flag, which has only two states, i.e., a "purchased" state and a "not-purchased" state. The recorder 5 is so arranged as to initially set the purchase flag of a program for sale to the not-purchased state, and set it to the purchased state in response to a receipt of an acknowledgement which is sent from the video software's center after the user has performed a predetermined operation.

[0067] In the above-described embodiments, the TS stream from the TS packetizer 12 has been recorded on the recording medium 9. However, any of the MPEG-2 bit stream from the TS processor 15, the video and audio digital outputs from the video and audio decoder 16, and the analog video and audio outputs from the elements 17 and 18 respectively may be recorded on the recording medium 9 as is apparent to those skilled in the art.

[0068] It should be noted that the present invention is applicable to a multimedia player without a recording capability as shown in FIG. 20. The player 6 of FIG. 20 is identical to the recorder 5 of FIG. 2 except that the elements 10-12 and 14 have been eliminated and the TS disc recorder 13 and the controller 19 have been replaced with a reproducer 27 and a controller 19c, respectively. In this embodiment, the recorded program information of each medium is stored only on the recording medium but not in the storage device 20. When a medium is inserted in the player 27, the program information recorded on the medium is preferably read out in the storage device 20 for subsequent use.

[0069] Many widely different embodiments of the present invention may be constructed without departing from the spirit and scope of the present invention. It should be understood that the present invention is not limited to the specific embodiments described in the specification, except as defined in the appended claims.

50

Claims

1. A method of managing recorded programs recorded in a recording medium in a broadcasting system comprising at least one transmitter and a plurality of terminals, wherein each transmitter broadcasts a data stream, a plurality of channels being multiplexed into each data stream, each channel comprising a plurality of programs and wherein each transmitter includes, in the data stream, program information comprising program information (PI) records associated with respective programs available in the broadcasting system, the method comprising the steps of: each terminal

permitting a user to select a desired one of said programs;
 adding said selected program to a recording queue which keeps program-identifying data sets in order of broadcast start time;
 recording on said recording medium a program identified by one of said program-identifying data sets in a first position of said recording queue;
 recording a program information record of said recorded program in a predetermined area on said recording medium;
 in response to a reception of a playing request from the user, displaying a program guide for said recorded programs recorded on said recording medium;
 prompting the user to select one of said recorded programs for play; and
 in response to the user selecting said one of said recorded programs, playing said selected recorded program to provide video and/or audio output(s).

5

10

15

20

25

30

35

40

45

50

55

60

65

70

75

80

85

90

95

100

105

110

115

120

125

130

135

140

145

150

155

160

165

170

175

180

185

190

195

200

205

210

215

220

225

230

235

240

245

250

255

260

265

270

275

280

285

290

295

300

305

310

315

320

325

330

335

340

345

350

355

360

365

370

375

380

385

390

395

400

405

410

415

420

425

430

435

440

445

450

455

460

465

470

475

480

485

490

495

500

505

510

515

520

525

530

535

540

545

550

555

560

565

570

575

580

585

590

595

600

605

610

615

620

625

630

635

640

645

650

655

660

665

670

675

680

685

690

695

700

705

710

715

720

725

730

735

740

745

750

755

760

765

770

775

780

785

790

795

800

805

810

815

820

825

830

835

840

845

850

855

860

865

870

875

880

885

890

895

900

905

910

915

920

925

930

935

940

945

950

955

960

965

970

975

980

985

990

995

1000

1005

1010

1015

1020

1025

1030

1035

1040

1045

1050

1055

1060

1065

1070

1075

1080

1085

1090

1095

1100

1105

1110

1115

1120

1125

1130

1135

1140

1145

1150

1155

1160

1165

1170

1175

1180

1185

1190

1195

1200

1205

1210

1215

1220

1225

1230

1235

1240

1245

1250

1255

1260

1265

1270

1275

1280

1285

1290

1295

1300

1305

1310

1315

1320

1325

1330

1335

1340

1345

1350

1355

1360

1365

1370

1375

1380

1385

1390

1395

1400

1405

1410

1415

1420

1425

1430

1435

1440

1445

1450

1455

1460

1465

1470

1475

1480

1485

1490

1495

1500

1505

1510

1515

1520

1525

1530

1535

1540

1545

1550

1555

1560

1565

1570

1575

1580

1585

1590

1595

1600

1605

1610

1615

1620

1625

1630

1635

1640

1645

1650

1655

1660

1665

1670

1675

1680

1685

1690

1695

1700

1705

1710

1715

1720

1725

1730

1735

1740

1745

1750

1755

1760

1765

1770

1775

1780

1785

1790

1795

1800

1805

1810

1815

1820

1825

1830

1835

1840

1845

1850

1855

1860

1865

1870

1875

1880

1885

1890

1895

1900

1905

1910

1915

1920

1925

1930

1935

1940

1945

1950

1955

1960

1965

1970

1975

1980

1985

1990

1995

2000

2005

2010

2015

2020

2025

2030

2035

2040

2045

2050

2055

2060

2065

2070

2075

2080

2085

2090

2095

2100

2105

2110

2115

2120

2125

2130

2135

2140

2145

2150

2155

2160

2165

2170

2175

2180

2185

2190

2195

2200

2205

2210

2215

2220

2225

2230

2235

2240

2245

2250

2255

2260

2265

2270

2275

2280

2285

2290

2295

2300

2305

2310

2315

2320

2325

2330

2335

2340

2345

2350

2355

2360

2365

2370

2375

2380

2385

2390

2395

2400

2405

2410

2415

2420

2425

2430

2435

2440

2445

2450

2455

2460

2465

2470

2475

2480

2485

2490

2495

2500

2505

2510

2515

2520

2525

2530

2535

2540

2545

2550

2555

2560

2565

2570

2575

2580

2585

2590

2595

2600

2605

2610

2615

2620

2625

2630

2635

2640

2645

2650

2655

2660

2665

2670

2675

2680

2685

2690

2695

2700

2705

2710

2715

2720

2725

2730

2735

2740

2745

2750

2755

2760

2765

2770

2775

2780

2785

2790

2795

2800

2805

2810

2815

2820

2825

2830

2835

2840

2845

2850

2855

2860

2865

2870

2875

2880

2885

2890

2895

2900

2905

2910

2915

2920

2925

2930

2935

2940

2945

2950

2955

2960

2965

2970

2975

2980

2985

2990

2995

3000

3005

3010

3015

3020

3025

3030

3035

3040

3045

3050

3055

3060

3065

3070

3075

3080

3085

3090

3095

3100

3105

3110

3115

3120

3125

3130

3135

3140

3145

3150

3155

3160

3165

3170

3175

3180

3185

3190

3195

3200

3205

3210

3215

3220

3225

3230

3235

3240

3245

3250

3255

3260

3265

3270

3275

3280

3285

3290

3295

3300

3305

3310

3315

3320

3325

3330

3335

3340

3345

3350

3355

3360

3365

3370

3375

3380

3385

3390

3395

3400

3405

3410

3415

3420

3425

3430

3435

3440

3445

3450

3455

3460

3465

3470

3475

3480

3485

3490

3495

3500

3505

3510

3515

3520

3525

3530

3535

3540

3545

3550

3555

3560

3565

3570

3575

3580

3585

3590

3595

3600

3605

3610

3615

3620

3625

3630

3635

3640

3645

3650

3655

3660

3665

3670

3675

3680

3685

3690

3695

3700

3705

3710

3715

3720

3725

3730

3735

3740

3745

3750

3755

3760

3765

3770

3775

3780

3785

3790

3795

3800

3805

3810

3815

3820

3825

3830

3835

3840

3845

3850

3855

3860

3865

3870

3875

3880

3885

3890

3895

3900

3905

3910

3915

3920

3925

3930

3935

3940

3945

3950

3955

3960

3965

3970

3975

3980

3985

3990

3995

4000

4005

4010

4015

4020

4025

4030

4035

4040

4045

4050

4055

4060

4065

4070

4075

4080

4085

4090

4095

4100

4105

4110

4115

4120

4125

4130

4135

4140

4145

4150

4155

4160

4165

4170

4175

4180

4185

4190

4195

4200

4205

4210

4215

4220

4225

4230

4235

4240

4245

4250

4255

4260

4265

4270

4275

4280

4285

4290

4295

4300

4305

4310

4315

4320

4325

4330

4335

4340

4345

4350

4355

4360

4365

4370

4375

4380

4385

4390

4395

4400

4405

4410

4415

4420

4425

4430

4435

4440

4445

4450

4455

4460

4465

4470

4475

4480

4485

4490

4495

4500

4505

4510

4515

4520

4525

4530

4535

4540

4545

4550

4555

4560

4565

4570

4575

4580

4585

4590

4595

4600

4605

4610

4615

4620

4625

4630

4635

4640

4645

4650

4655

4660

4665

4670

4675

4680

4685

4690

4695

4700

4705

4710

4715

4720

4725

4730

4735

4740

4745

4750

4755

4760

4765

4770

4775

4780

4785

4790

4795

4800

4805

4810

4815

4820

4825

4830

4835

4840

4845

4850

4855

4860

4865

4870

4875

4880

4885

4890

4895

4900

4905

4910

4915

4920

4925

4930

4935

4940

4945

4950

4955

4960

4965

4970

4975

4980

4985

4990

4995

5000

5005

5010

5015

5020

5025

5030

5035

5040

5045

5050

5055

5060

5065

5070

5075

5080

5085

5090

5095

5100

5105

5110

5115

5120

5125

5130

5135

5140

5145

5150

5155

5160

5165

5170

5175

5180

5185

5190

5195

5200

5205

5210

5215

5220

5225

5230

5235

5240

5245

5250

5255

5260

5265

5270

5275

5280

5285

5290

5295

5300

5305

5310

5315

5320

5325

5330

5335

5340

5345

5350

5355

5360

5365

5370

5375

5380

5385

5390

5395

5400

5405

5410

5415

5420

5425

5430

5435

5440

5445

5450

5455

5460

5465

5470

5475

5480

5485

5490

5495

5500

5505

5510

5515

5520

5525

5530

5535

5540

5545

5550

5555

5560

5565

5570

5575

5580

5585

5590

5595

5600

5605

5610

5615

5620

5625

5630

5635

5640

5645

5650

5655

5660

5665

5670

5675

5680

5685

5690

5695

5700

5705

5710

5715

5720

5725

5730

5735

5740

5745

5750

5755

5760

5765

5770

5775

5780

5785

5790

5795

5800

5805

5810

5815

5820

5825

5830

5835

5840

5845

5850

5855

5860

5865

5870

5875

5880

5885

5890

5895

5900

5905

5910

5915

5920

5925

5930

5935

5940

5945

5950

5955

5960

5965

5970

5975

5980

5985

5990

5995

6000

6005

6010

6015

6020

6025

6030

6035

6040

6045

6050

6055

6060

6065

6070

6075

6080

6085

6090

6095

6100

6105

6110

6115

6120

6125

6130

6135

6140

6145

6150

6155

6160

6165

6170

6175

6180

6185

6190

6195

6200

6205

6210

6215

6220

6225

6230

6235

6240

6245

6250

6255

6260

6265

6270

6275

6280

6285

6290

6295

6300

6

8. A method as defined in claim 2, wherein if there are any broadcast schedules for related programs relating to said recorded programs, said program guide includes only broadcast schedules for related programs which relates to said recorded programs and which have not yet been broadcast.

5 9. A method as defined in claim 1, further including the steps of:

10 said transmitter including, in said PI record of each of programs, a code indicative of whether the program is for rental and, if the program is for rental, a center telephone number; the user selecting a recorded program with an indication of rental; said terminal permitting the user to applying for a rent of said selected recorded program; including a limit value determined by said application in said PI record of said selected recorded program; and only if said limit value is not reached, permitting an executing of said playing step.

15 10. A method as defined in claim 9, further including the steps of:

20 said transmitter transmitting label information for use in printing a label to be put on said recording medium; and printing at least a part of said label information on a label.

25 11. A method as defined in claim 1, wherein said recording medium is a removable disc medium.

20 12. A method as defined in claim 1, wherein said recording medium is a removable tape medium, wherein said step of recording a program includes the step of recording said program and PI record associated with said program in time-division-multiplexing.

25 13. A method as defined in claim 12, wherein said step of recording said program and PI record including the steps of adjusting a recording frequency of said PI record according to a possible maximum recording rate minus a transmission rate required for said program.

30 14. A method as defined in claim 1, further including the steps of

35 when a recording medium is recorded for the first time, recording a medium ID unique to said recording medium at a predetermined location in said predetermined area of said recording medium; including, in said PI record of each of recorded programs of recording media that have been recorded by said terminal, said medium ID of a recording medium storing the recorded program; including, in said PI record of each of recorded programs of recording media that have been recorded by said terminal, a recorded program ID unique to the recorded program; storing, in a storage device, all of said PI records for said recorded programs of recording media that have been recorded by said terminal, and permitting the user to retrieve a desired program.

40 15. A method as defined in claim 14, wherein said recording media is a removable disc medium, wherein the method further includes the steps of, each time of loading said disc media, updating relevant PI records stored in said storage device.

45 16. A method as defined in claim 1, wherein said recording medium is a removable tape medium and wherein the method further includes the steps of

50 when a recording medium is recorded for the first time, recording a medium ID unique to said recording medium at a predetermined location in said predetermined area of said recording medium; including, in said PI record of each of recorded programs of recording media that have been recorded by said terminal, said medium ID of a recording medium storing the recorded program; including, in said PI record of each of recorded programs of recording media that have been recorded by said terminal, a recorded program ID unique to the recorded program; storing, in a storage device, all of said PI records for said recorded programs of recording media that have been recorded by said terminal, and at a time of accessing a neighborhood of said predetermined area, copying said PI records of programs recorded on said recording medium which are stored in said storage device to said predetermined area of said

recording medium, wherein said step of displaying a program guide uses said PI records stored in said storage device.

5 17. A method as defined in claim 16, wherein said step of recording a program includes the step of recording said program and said medium ID in time-division-multiplexing, said medium ID being recorded in a raised frequency, wherein the method further includes the step of, at a time of loading said medium, obtaining said medium ID by winding said tape in either direction; and wherein said step of displaying a program guide includes the step of reading said PI records stored in said storage device by using said obtained medium ID.

10 18. A multimedia terminal capable of managing recorded programs recorded in a recording medium in a broadcasting system comprising at least one transmitter and a plurality of terminals, wherein each transmitter broadcasts a data stream, a plurality of channels being multiplexed into each data stream, each channel comprising a plurality of programs and wherein each transmitter includes, in the data stream, program information comprising program information (PI) records associated with respective programs available in the broadcasting system, the multimedia terminal comprising:

20 means for permitting a user to select a desired one of said programs;
means for adding said selected program to a recording queue which keeps program-identifying data sets in order of broadcast start time;

25 means for recording on said recording medium a program identified by one of said program-identifying data sets in a first position of said recording queue;
means for recording a program information record of said recorded program in a predetermined area on said recording medium;

30 means, responsive to a reception of a playing request from the user, for displaying a program guide for said recorded programs recorded on said recording medium;
means for prompting the user to select one of said recorded programs for play; and

35 means, responsive to the user selecting said one of said recorded programs, for playing said selected recorded program to provide video and/or audio output(s).

40 19. A multimedia terminal as defined in claim 18, wherein broadcast schedules for programs relating to each program are optionally included in said program information, wherein said means for displaying a program guide includes means, activated in the event there are any broadcast schedules for related programs relating to said recorded programs, for including said any broadcast schedules in said program guide, wherein said prompting means includes means for permitting the user to select one of said related programs, and wherein the multimedia terminal further includes means, responsive to the user selecting said one of said related programs, for adding said selected related program to said recording queue.

45 20. A multimedia terminal as defined in claim 18, wherein said playing means includes:

means, responsive to a predetermined input by the user, for displaying a program information for said selected recorded program, said program information including information on related programs relating to said selected recorded program;
means for permitting the user to selecting one of said related programs for recording; and

50 means, responsive to the user selecting said one of said related programs, for adding said selected related program to said recording queue.

55 21. A multimedia terminal as defined in claim 19, wherein said related programs are serialized programs.

22. A multimedia terminal as defined in claim 20, wherein said related programs are serialized programs.

23. A multimedia terminal as defined in claim 19, wherein a recommended program list relating to a program or a channel is optionally included in said program information, wherein said means for displaying a program guide includes means for displaying recommended program information relating to said recorded programs and to channels including said recorded programs, and wherein said means for permitting the user to select one of said related programs includes means for permitting the user to select one of said related programs and programs included in said recommended program information.

24. A multimedia terminal as defined in claim 18, wherein said means for permitting a user to select a desired one of

said programs includes means for permitting a user to select such a program as is to be broadcast concurrently with at least one program which is registered in said recording queue and which is included in a same data stream that includes such said program, wherein said recording means includes:

5 means for extracting such said program and said at least one program from said same data stream;
 means for converting said such said program and said at least one program into a time-division-multiplexed
 packet stream in a same form as said data stream; and
 means for recording said time-division-multiplexed packet stream on said recording media.

10 25. A multimedia terminal as defined in claim 18, wherein said means for permitting a user to select a desired one of
 said programs includes means for permitting a user to select one of video channels and one of audio channels, said
 video and audio channels constituting said desired program, wherein said recording means includes:

15 means for extracting video data of said selected video channel and audio data of said selected audio channel
 from a data stream including said video and audio channels;
 means for converting said video data and said audio data into a time-division-multiplexed packet stream in a
 same form as said data stream; and
 means for recording said time-division-multiplexed packet stream on said recording media.

20 26. A multimedia terminal as defined in claim 25, wherein said PI record of each of programs that varies in its channel
 configuration in a middle of duration thereof includes time periods for respective channel configurations of the pro-
 gram and a channel configuration for each of said time period, each channel configuration indicating said video and
 audio channels that constitute the program for a time period associated with said each channel configuration,
 wherein said means for permitting a user and said displaying means includes means for displaying said time peri-
 ods and corresponding channel configurations, and wherein said means for permitting a user to select one of video
 channels and one of audio channels includes means for selecting, for each time period, a video and a audio chan-
 nel from a channel configuration associated with the time period.

25 27. A multimedia terminal as defined in claim 19 wherein said broadcast schedules for related programs includes only
 broadcast schedules for related programs that have not yet been broadcast.

30 28. A multimedia terminal as defined in claim 19, wherein said means for including said any broadcast schedules in
 said program guide includes means for including only broadcast schedules for related programs which relates to
 said recorded programs and which have not yet been broadcast.

35 29. A multimedia terminal as defined in claim 18, wherein said PI record of each of programs includes a code indicative
 of whether the program is for rental and, if the program is for rental, a center telephone number, and wherein the
 multimedia terminal further includes:

40 means for permitting the user to elect a recorded program with an indication of rental;
 means for permitting the user to applying for a rent of said selected recorded program;
 means for including a limit value determined by said application in said PI record of said selected recorded pro-
 gram; and
 means, activated only in the event said limit value is not reached, for permitting an executing of said playing
 step.

45 30. A multimedia terminal as defined in claim 29, further including:

50 means for receiving, from said broadcasting transmitter, label information for use in printing a label to be put
 on said recording medium; and means for printing at least a part of said label information on a label.

55 31. A multimedia terminal as defined in claim 18, wherein said recording medium is a removable disc medium.

32. A multimedia terminal as defined in claim 18, wherein said recording medium is a removable tape medium, wherein
 said means for recording a program includes means for recording said program and PI record associated with said
 program on said recording medium.

33. A multimedia terminal as defined in claim 32, wherein said means for recording said program and PI record includ-

ing means for adjusting a recording frequency of said PI record according to a possible maximum recording rate minus a transmission rate required for said program.

34. A multimedia terminal as defined in claim 18, further including:

5 means, activated when a recording medium is recorded for the first time, for recording a medium ID unique to said recording medium at a predetermined location in said predetermined area of said recording medium; means for including, in said PI record of each of recorded programs of recording media that have been recorded by said terminal, said medium ID of a recording medium storing the recorded program;

10 means for including, in said PI record of each of recorded programs of recording media that have been recorded by said terminal, a recorded program ID unique to the recorded program; means for storing, in a storage device, all of said PI records for said recorded programs of recording media that have been recorded by said terminal, and means for permitting the user to retrieve a desired program.

15 35. A multimedia terminal as defined in claim 34, wherein said recording media is a removable disc medium, wherein the multimedia terminal further includes means, activated each time of loading said disc media, for updating relevant PI records stored in said storage device.

20 36. A multimedia terminal as defined in claim 18, wherein said recording medium is a removable tape medium and wherein the multimedia terminal further includes:

25 means, activated when a recording medium is recorded for the first time, for recording a medium ID unique to said recording medium at a predetermined location in said predetermined area of said recording medium; means for including, in said PI record of each of recorded programs of recording media that have been recorded by said terminal, said medium ID of a recording medium storing the recorded program;

30 means for including, in said PI record of each of recorded programs of recording media that have been recorded by said terminal, a recorded program ID unique to the recorded program; means for storing, in a storage device, all of said PI records for said recorded programs of recording media that have been recorded by said terminal, and means, activated at a time of accessing a neighborhood of said predetermined area, for copying said PI records of programs recorded on said recording medium which are stored in said storage device to said predetermined area of said recording medium, wherein said means for displaying a program guide uses said PI records stored in said storage device.

35 37. A multimedia terminal as defined in claim 36, wherein said means for recording a program includes means for recording said program and said medium ID in time-division-multiplexing, said medium ID being recorded in a raised frequency, wherein the multimedia terminal further includes means, activated at a time of loading said medium, for obtaining said medium ID by winding said tape in either direction; and wherein said means for displaying a program guide includes means for reading said PI records stored in said storage device by using said obtained medium ID.

40 38. A multimedia terminal as defined in claim 18, wherein said PI record of each of programs includes a code indicative of whether the program is for rental and, if the program is for rental, a center telephone number, and wherein the multimedia terminal further includes:

45 means for permitting the user to elect a recorded program with an indication of rental; means for permitting the user to applying for a rent of said selected recorded program; means, responsive to a request for playing one of rental programs, for referring to a rental center for a validity of said one of said rental program; and means, activated only in the event said one of said rental program is valid, for enabling said playing means.

50 39. A multimedia reproducer for reproducing recorded programs recorded on a recording medium, wherein program information comprising program information (PI) records associated with said recorded programs is also recorded on the recording medium, the multimedia reproducer comprising:

55 means, responsive to a reception of a reproducing request from the user, for displaying a program guide for said recorded programs and prompting the user to select one of said recorded programs for play; and

EP 0 940 985 A2

means, response to the user selecting said one of said recorded programs, for reproducing said selected recorded program.

5 40. A multimedia reproducer as defined in claim 39, wherein said PI record of each of programs includes a code indicative of whether the program is for rental and, if the program is for rental, a center telephone number, and wherein the multimedia reproducer further includes:

10 means for permitting the user to elect a recorded program with an indication of rental;
means for permitting the user to applying for a rent of said selected recorded program;
means for including a limit value determined by said application in said PI record of said selected recorded program; and
means, activated only in the event said limit value is not reached, for enabling said playing means.

15 41. A multimedia terminal as defined in claim 40, further including:

20 means for receiving, from external, label information for use in printing a label to be put on said recording medium; and
means for printing at least a part of said label information on a label.

25

30

35

40

45

50

55

FIG. 1

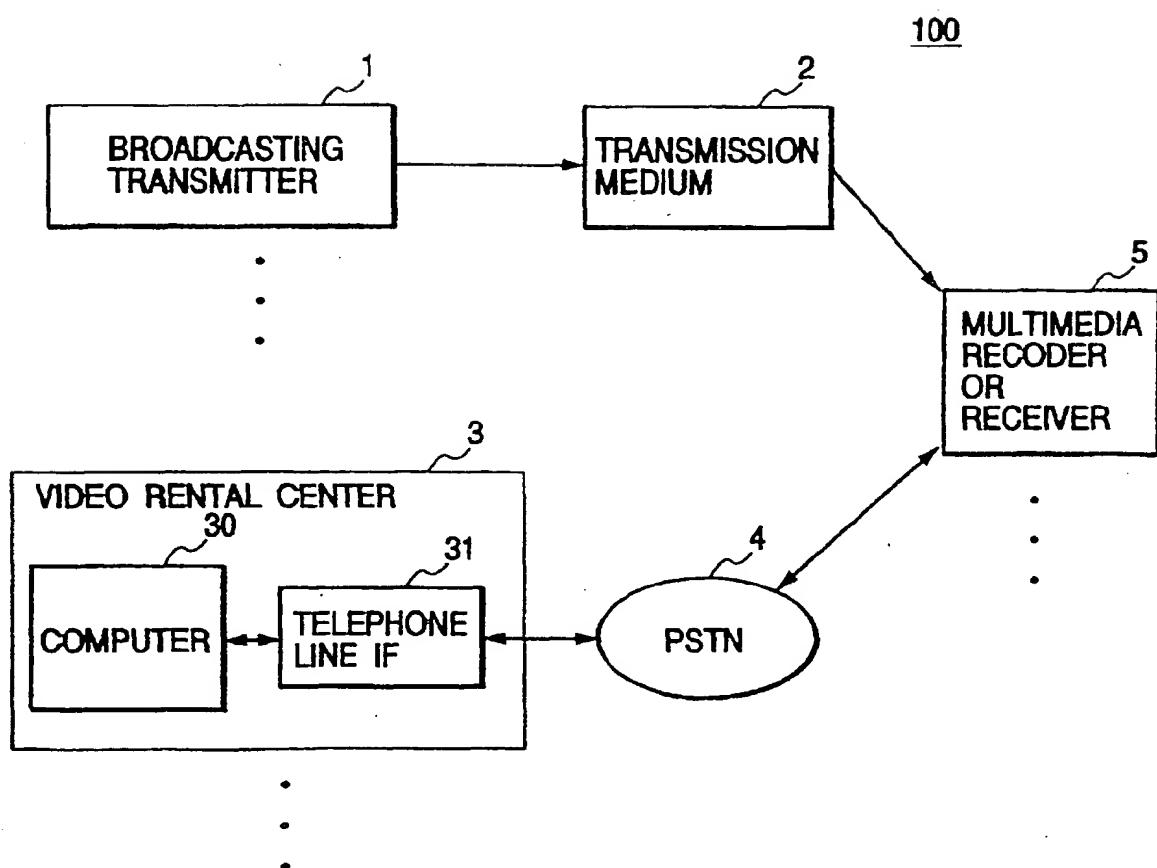


FIG. 2

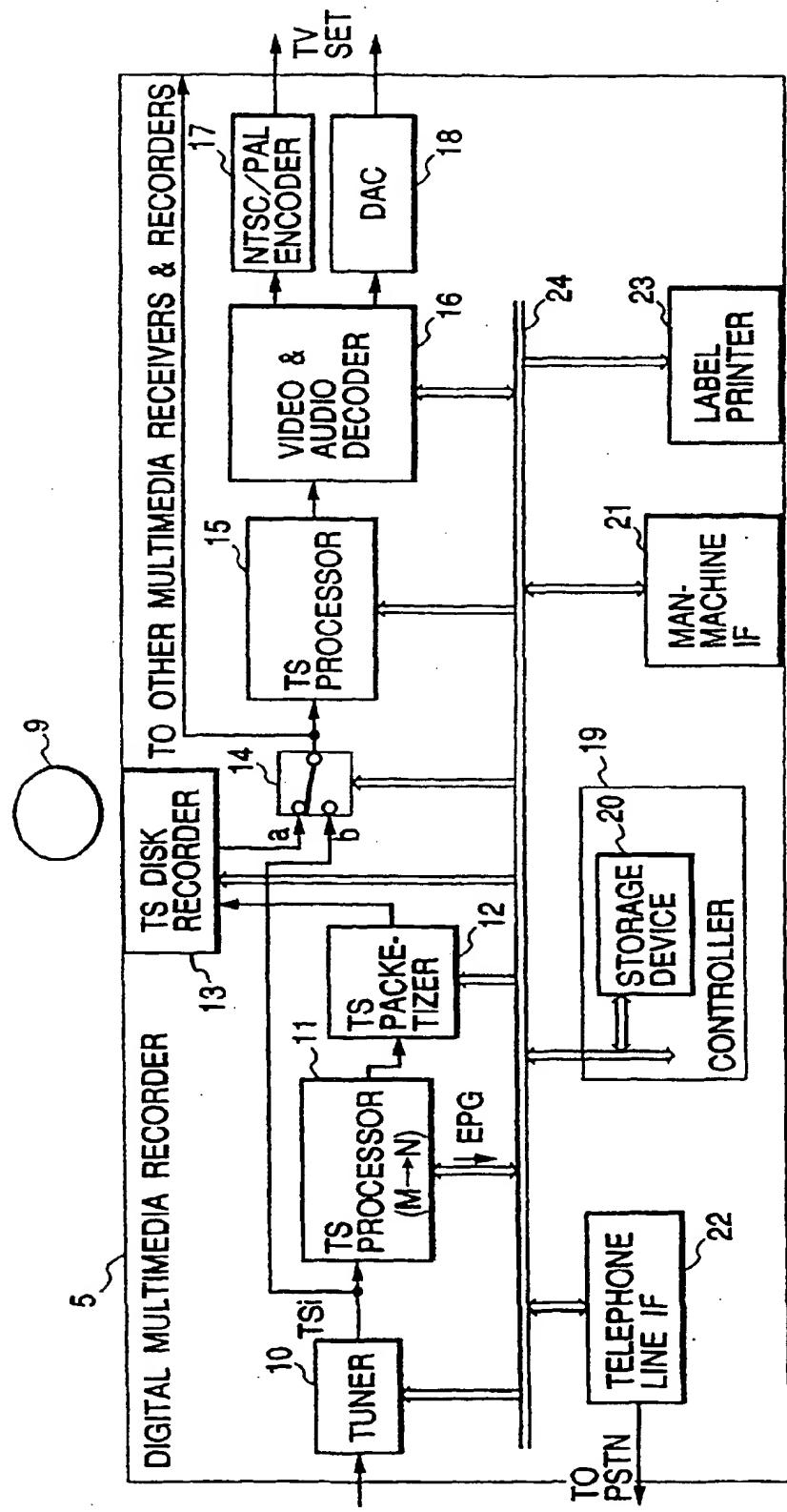


FIG. 3

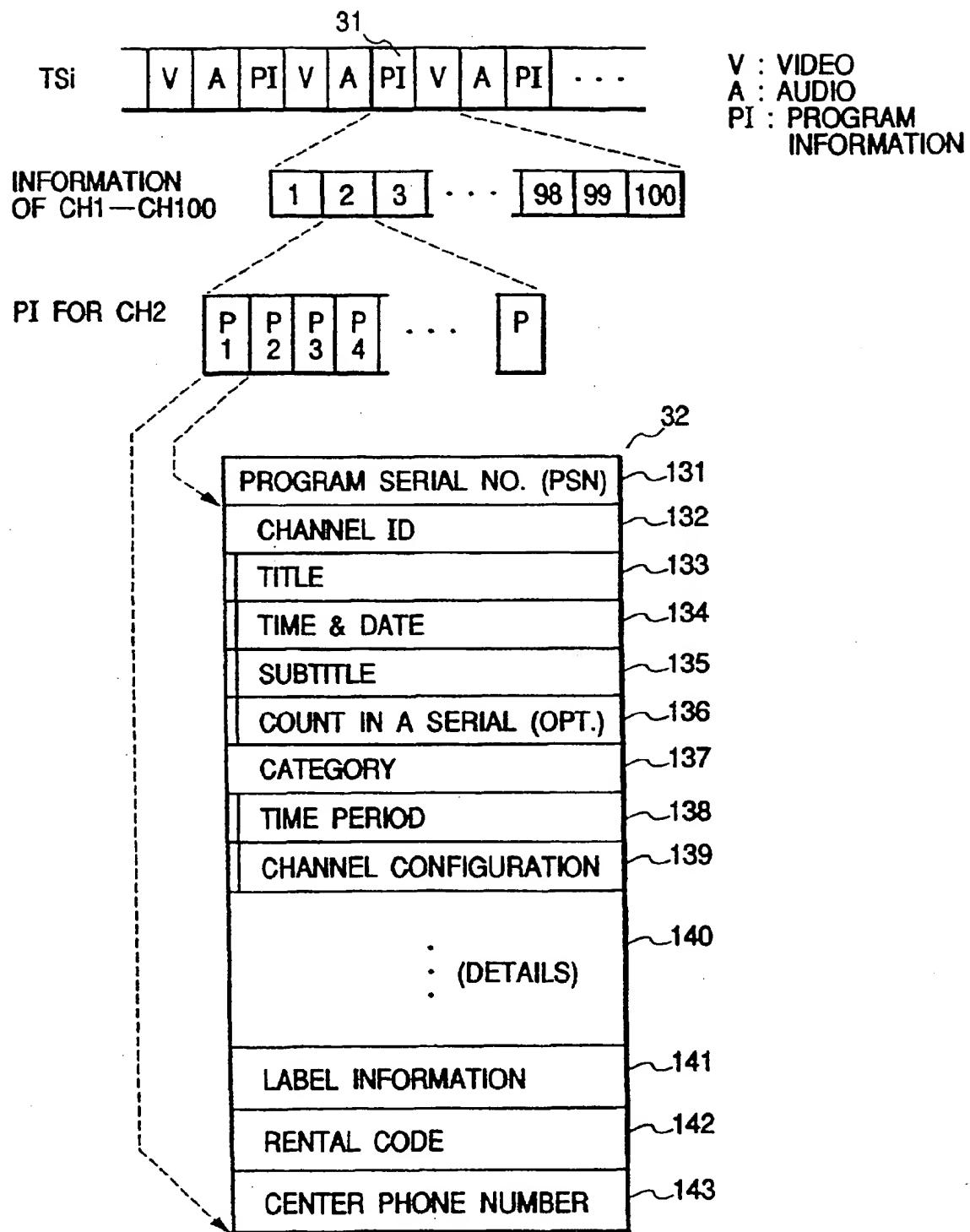


FIG. 4

PROGRAM INFORMATION TABLE STORED IN THE STORAGE DEVICE 20

131	132	133	134	135	136	137	138	321	139	140
...
100123	45	DORA THE VAGRANT	1998/2/6 20:00-20:54	DORA GOES TO DENVER	3/15	D7	0-54	VIDEO1: NTSC		
			1998/2/13 20:00-20:54	DORA GOES TO BOSTON	4/15			AUDIO1: STEREO		
			1998/2/20 20:00-20:54	DORA GOES TO AUSTIN	5/15					
			1998/2/27 20:00-20:54	DORA GOES TO ALBANY	6/15					
...
100234	56	NFL99: THE SUPER BOWL	1998/2/6 18:00-20:59	XX vs. YY				S4 0-119	VIDEO1: NTSC [ORDINARY RELAY]	
								VIDEO2: NTSC [XX SIDE]		
								VIDEO3: NTSC [YY SIDE]		
								AUDIO1: STEREO [ORDINARY RELAY]		
								AUDIO2: MONO [ON THE XX SIDE]		
								AUDIO3: MONO [ON THE YY SIDE]		
								120-179	VIDEO1: NTSC [ORDINARY RELAY]	
								VIDEO2: NTSC [XX SIDE]		
								VIDEO3: NTSC [YY SIDE]		
								AUDIO1: STEREO [ORDINARY RELAY]		
								AUDIO2: MONO [ON THE XX SIDE]		
								AUDIO3: MONO [ON THE YY SIDE]		
								AUDIO4: MONO [COMMENTARY]		
...

FIG. 5

RECOMMENDED PROGRAM LIST TRANSMITTED IN THE EVENT
LIST TABLE40

LIST TITLE	THE NAGANO WINTER OLYMPICS RELAY	41
VALID PERIOD	1998/2/7-1998/2/18	42
CHANNEL NUMBER	BROADCAST TIME & DATE	
15	1998/2/7 10:00-11:59	
7	1998/2/9 13:00-14:59	
8	1998/2/13 13:00-14:59	
:	:	
:	:	

132

134

FIG. 7

RECORDING QUEUE

CHANNEL NUMBER	BROADCAST TIME & DATE
17	1998/2/10 17:00-17:59
78	1998/2/11 13:00-14:59
6	1998/2/11 21:00-22:56

45

132

134

FIG. 6

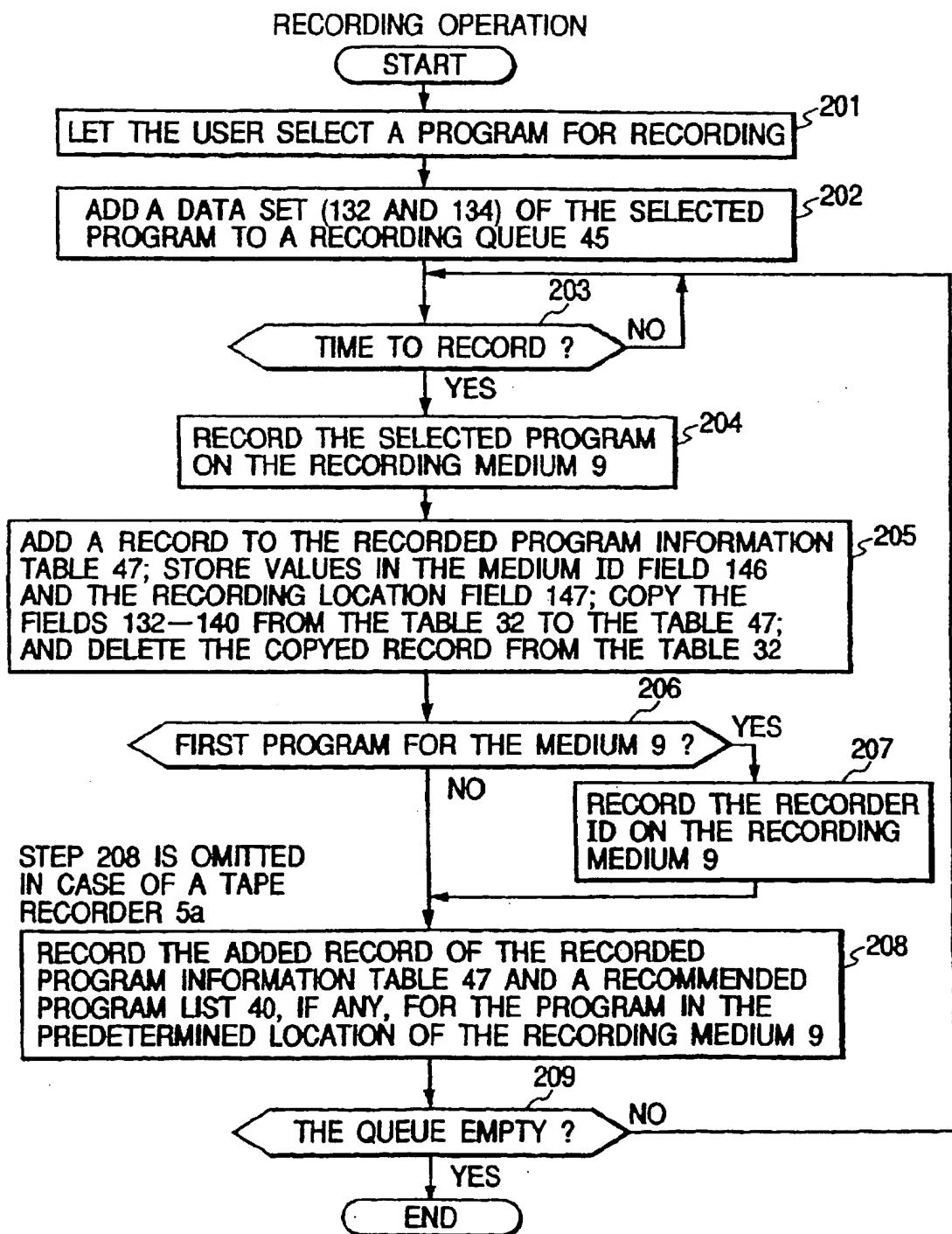


FIG. 8

FIG. 9

RECORDED PROGRAM INFORMATION (RPI)
RECORDED ON THE RECORDING MEDIUM

RECODER 5 ID	~151
RPI RECORDS	~47
RECOMMENDED PROGRAM LISTS (IF ANY)	~40

FIG. 10

LABEL PRINTING OPERATION

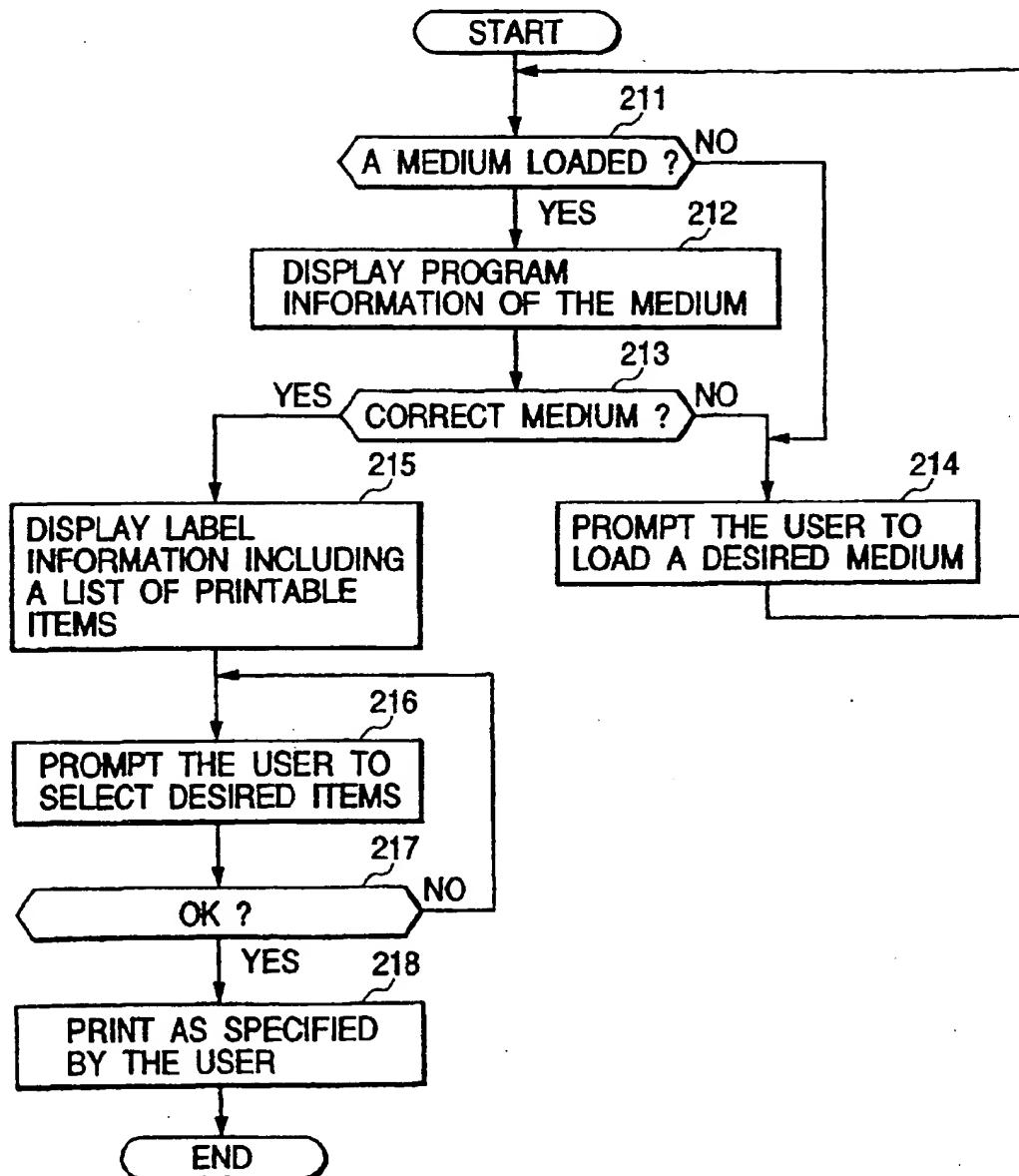


FIG. 11

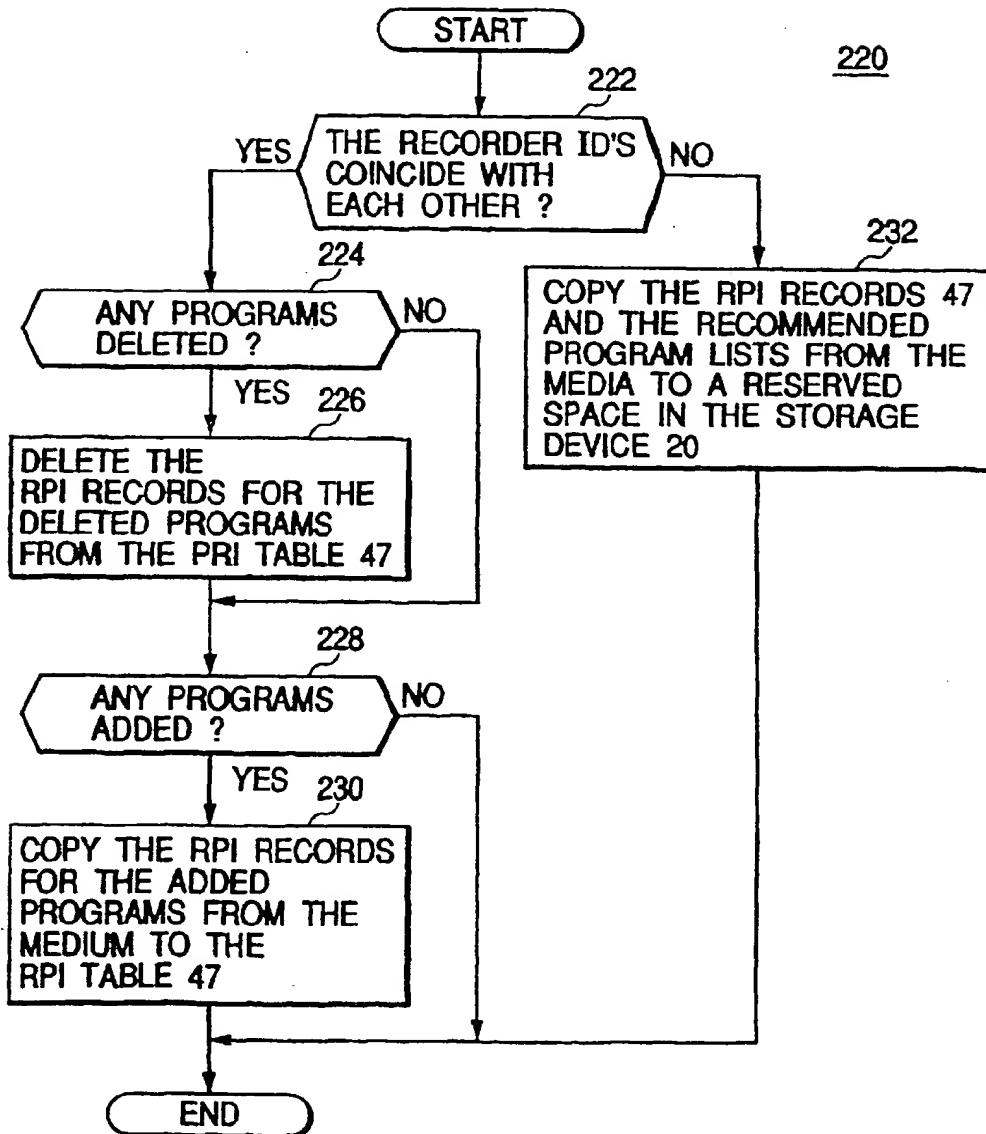
RPI TABLE MAINTENANCE OPERATION 220
AT THE TIME OF MEDIUM LOADING

FIG. 12

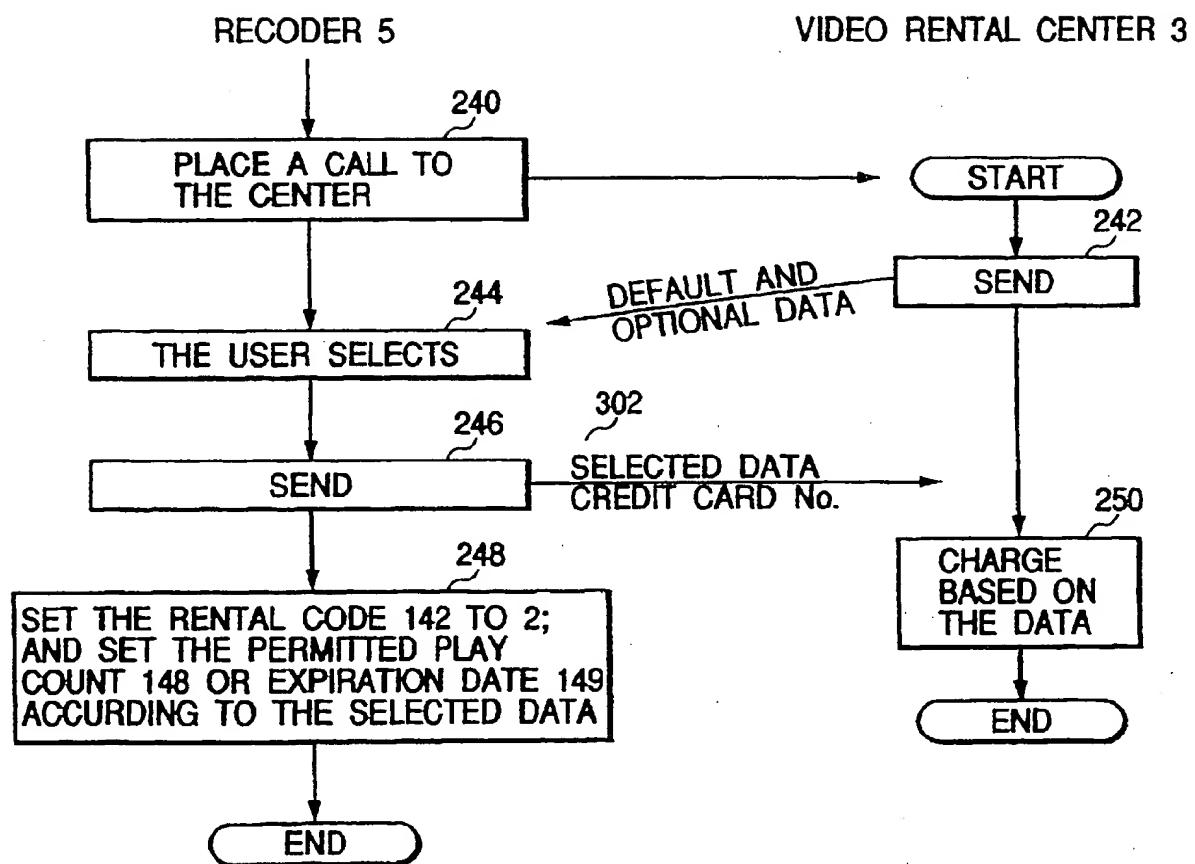


FIG. 13

REPLAY OPERATION

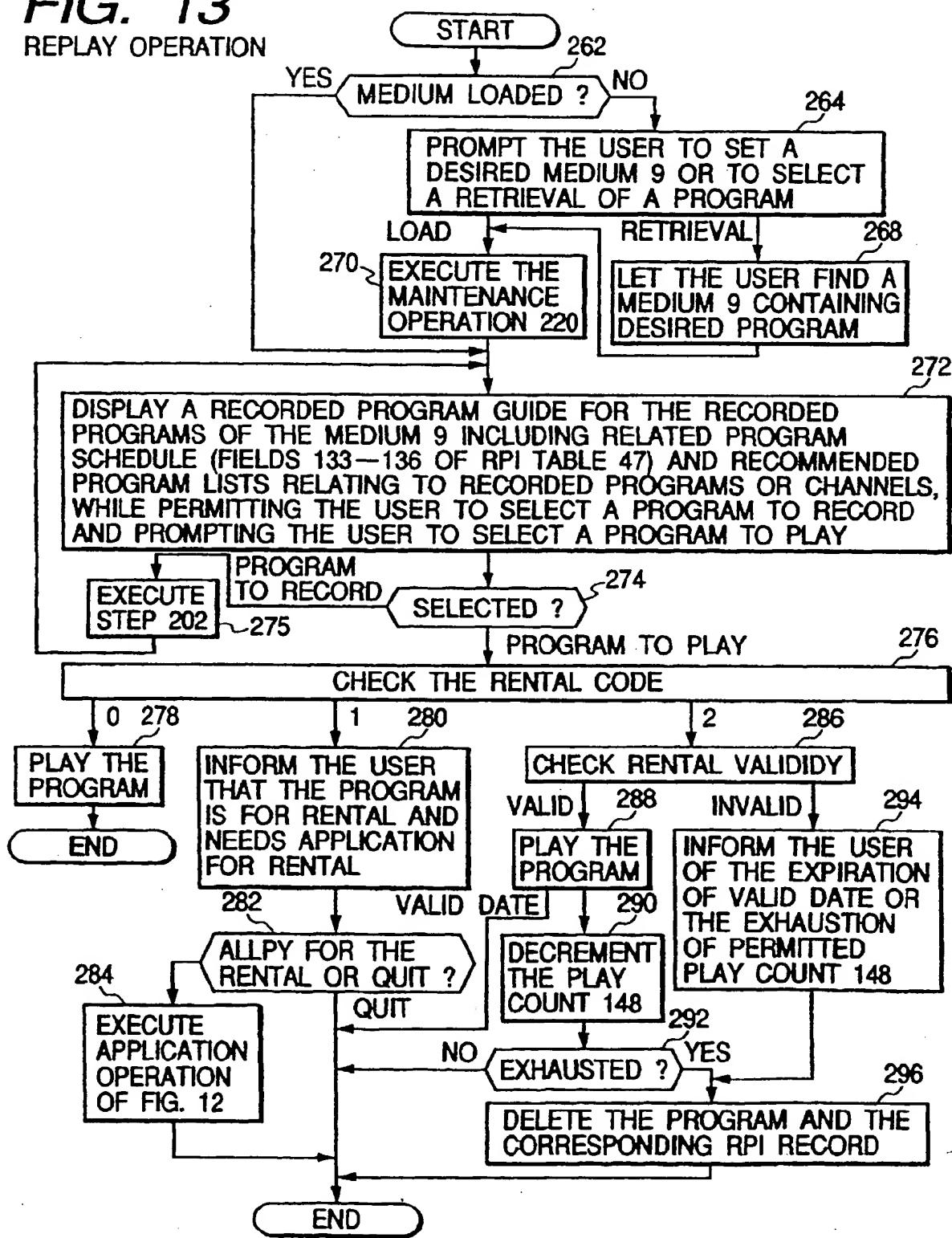


FIG. 14

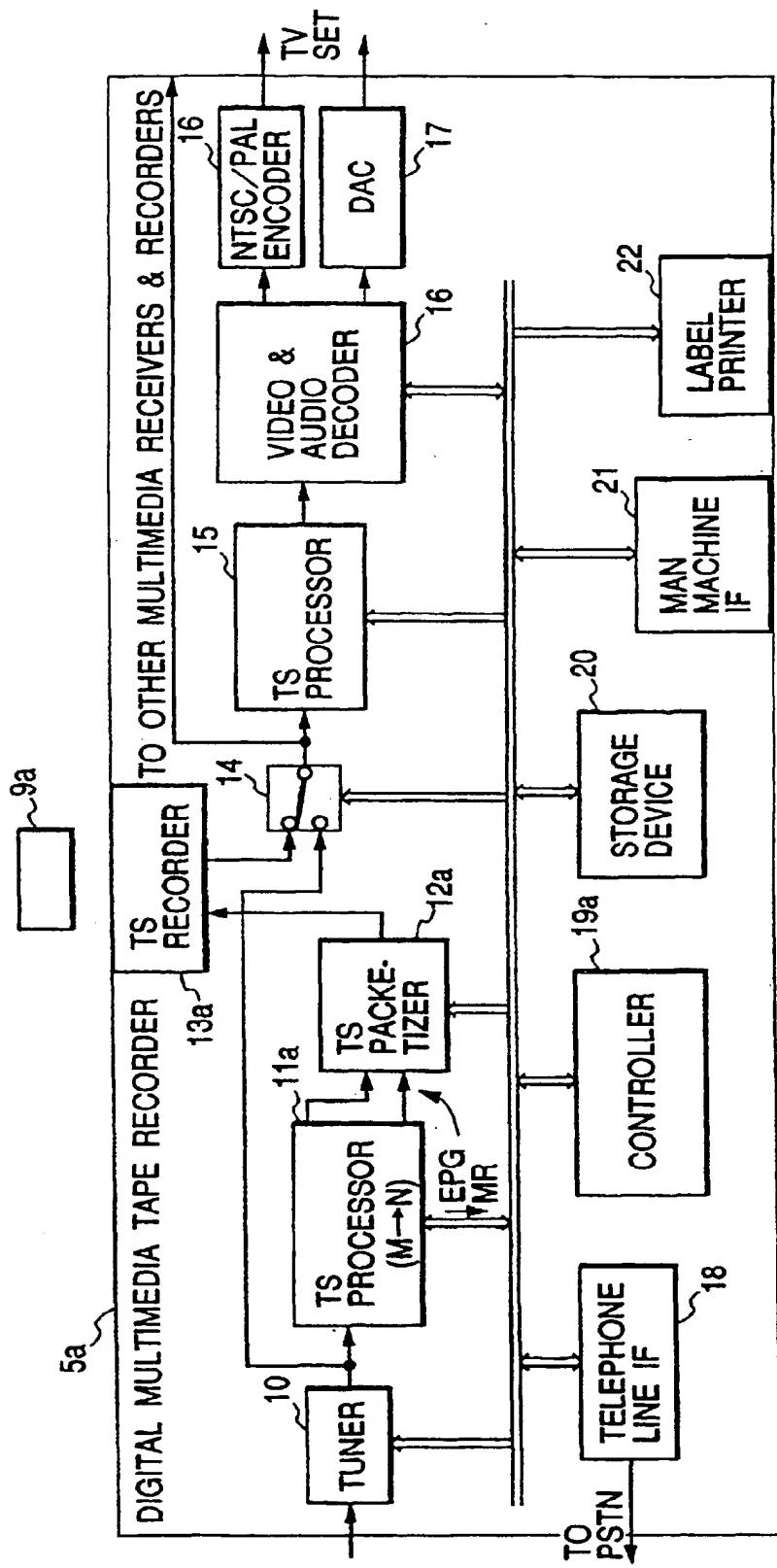


FIG. 15

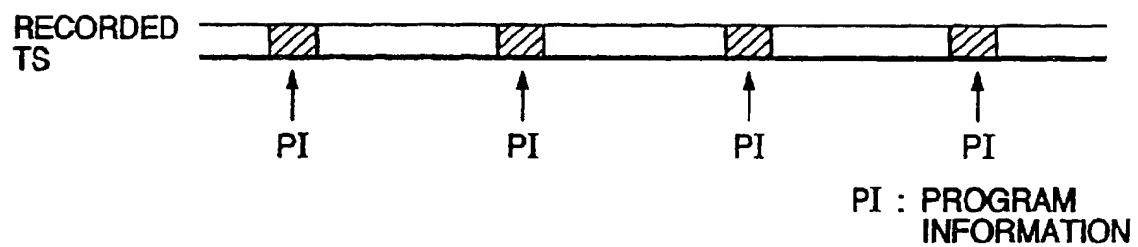


FIG. 17

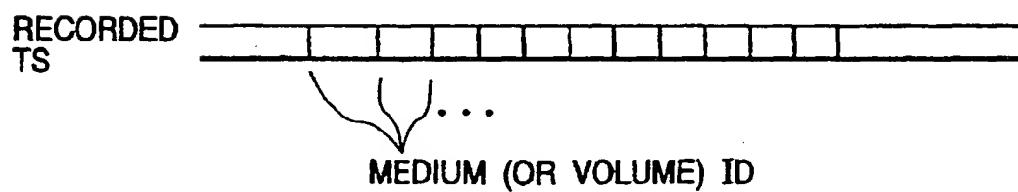


FIG. 16

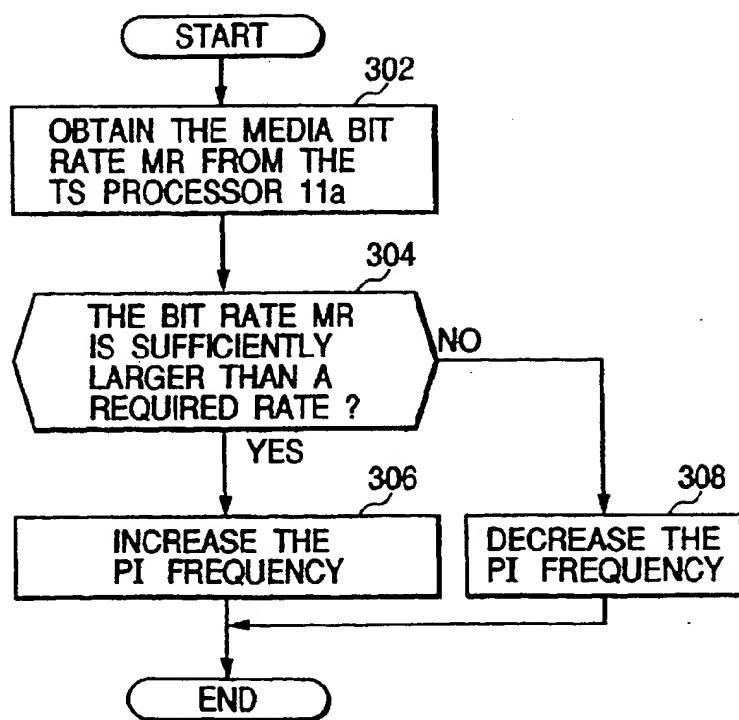


FIG. 18

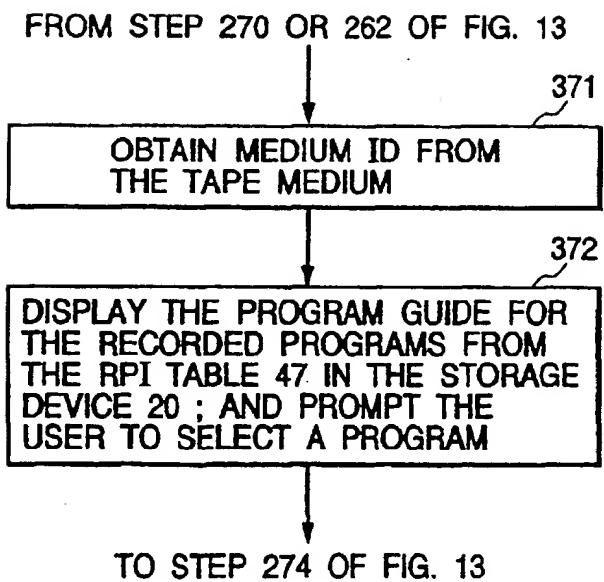


FIG. 19

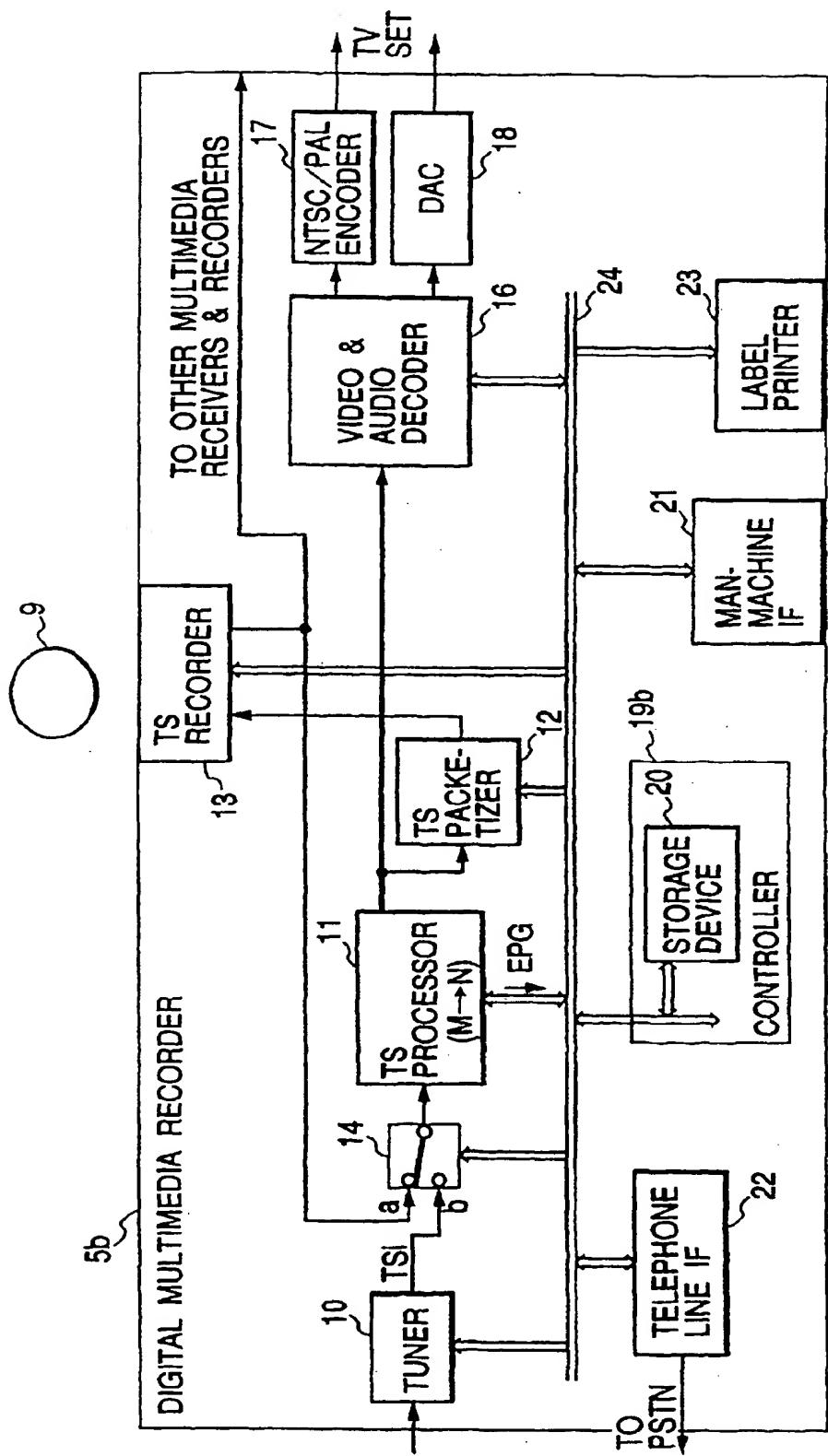
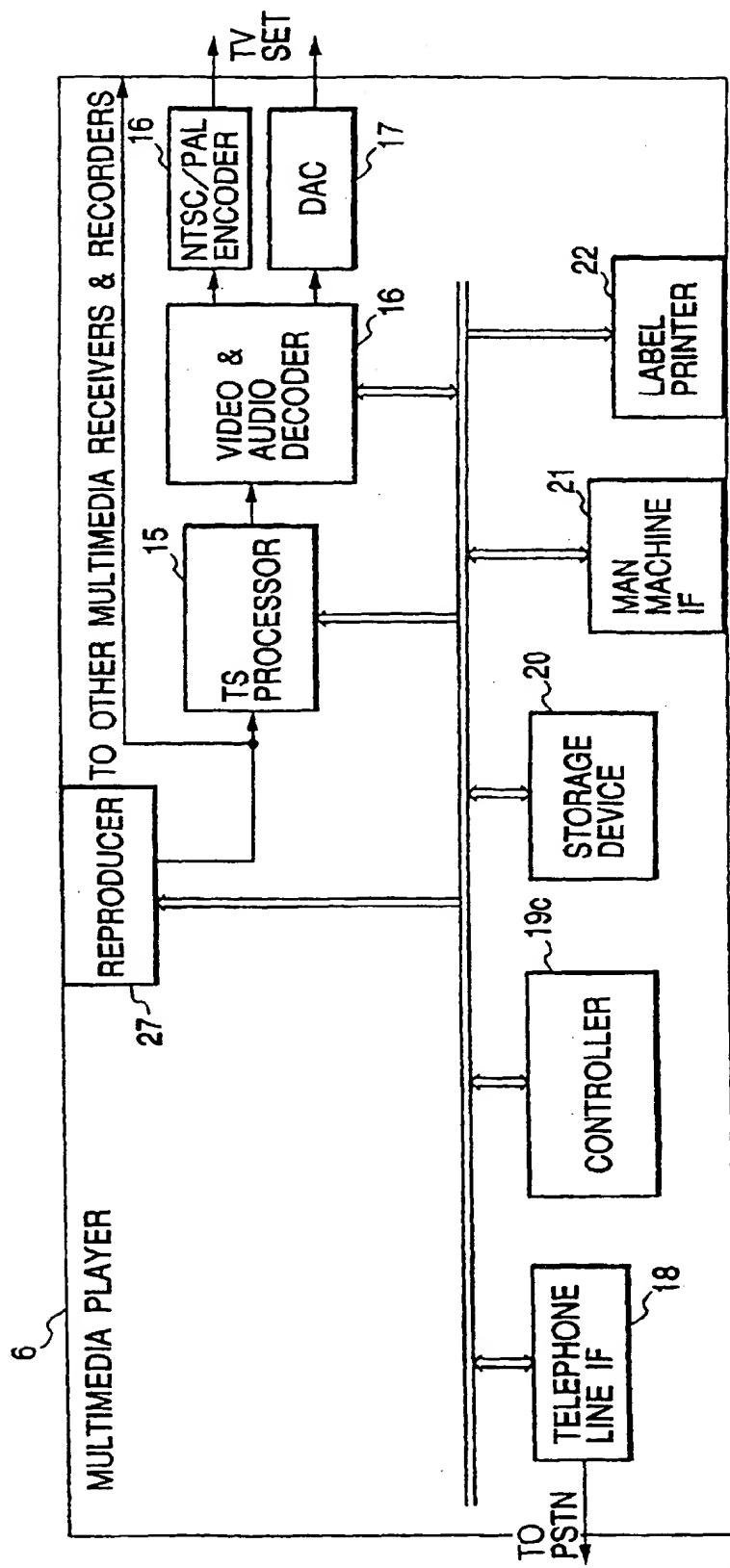


FIG. 20



(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 940 985 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
26.11.2003 Bulletin 2003/48

(51) Int Cl.7: G11B 27/32, H04N 5/445,
H04N 5/00, H04N 5/765

(43) Date of publication A2:
08.09.1999 Bulletin 1999/36

(21) Application number: 99104176.5

(22) Date of filing: 02.03.1999

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE

Designated Extension States:
AL LT LV MK RO SI

(30) Priority: 03.03.1998 JP 6603898

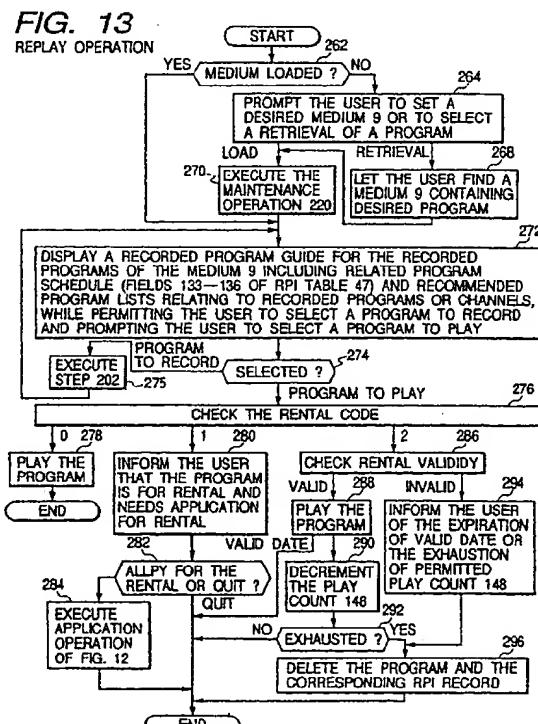
(71) Applicant: MATSUSHITA ELECTRIC INDUSTRIAL
CO., LTD.
Kadoma-shi, Osaka 571-8501 (JP)

(72) Inventor: Tsukidate, Ryota
Tokyo 125-0063 (JP)

(74) Representative:
Manitz, Finsterwald & Partner GbR
Postfach 31 02 20
80102 München (DE)

(54) Multimedia recorder with enhanced EPG-related functions

(57) A digital multimedia recorder that makes good use of EPG data to have at least one of the following capabilities of: (a) selecting a program to be played from a displayed program guide for recorded programs; (b) including, in the displayed program guide, program information on programs relating to each of the recorded programs thereby to permit the user to program the recorder to record a selected one of the related program; (c) recording a plurality of programs broadcast at the same time; (d) record a multi-channel program whose channel configuration changes in the middle of the program so as to support the capability (a); and (e) playing a recorded program within a limit prescribed in a contract with a provider. The information includes information on related programs, if any (which are related with each program), and information on recommended programs which a broadcasting party recommends to the subscribers.



EP 0 940 985 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 10 4176

DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	EP 0 705 036 A (SONY CORP) 3 April 1996 (1996-04-03)	1,11,12, 18,31, 32,39
Y	* column 15, line 52 - column 18, line 34; figure 1A *	2-10, 13-17, 19,20, 23-30, 33-36, 40,41
	* column 28, line 54 - column 29, line 58	
	*	
	* column 36, line 49 - column 38, line 39	
	*	
X	---	
	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 04, 31 March 1998 (1998-03-31) -& JP 09 326993 A (TOSHIBA CORP), 16 December 1997 (1997-12-16)	1,18,39
	* abstract *	
	* paragraph [0011] - paragraph [0012] *	
	* paragraph [0025] - paragraph [0057] *	
X	---	
	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 01, 30 January 1998 (1998-01-30) -& JP 09 247603 A (MATSUSHITA ELECTRIC IND CO LTD), 19 September 1997 (1997-09-19)	1,18,39
Y	* abstract *	13,17,33
	* the whole document *	
Y	---	
	US 5 543 929 A (NG YEE K ET AL) 6 August 1996 (1996-08-06)	2-9, 14-16, 19,20, 23-29, 34-36,40
	* column 5, line 37 - column 11, line 51; figures 15A,16 *	

The present search report has been drawn up for all claims		
Place of search	Date of completion of the search	Examiner
MUNICH	2 October 2003	McGrath, S
CATEGORY OF CITED DOCUMENTS		<p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>
<p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p>		



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 99 10 4176

DOCUMENTS CONSIDERED TO BE RELEVANT					
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)		
Y	US 5 488 409 A (KWOH DANIEL S ET AL) 30 January 1996 (1996-01-30) * column 21, line 5 - line 39; figure 1 * ---	10,30,41			
A	JP 10 042242 A (SONY CORP) 13 February 1998 (1998-02-13) & US 5 909 212 A (HANAI TOMOYUKI ET AL) 1 June 1999 (1999-06-01) * abstract *	1-41			
A	US 5 541 738 A (MANKOVITZ ROY J) 30 July 1996 (1996-07-30) * the whole document *	1-41			
A	WO 97 49237 A (STARLIGHT TELECAST INC) 24 December 1997 (1997-12-24) * the whole document *	1-41			
	-----		TECHNICAL FIELDS SEARCHED (Int.Cl.6)		
The present search report has been drawn up for all claims					
Place of search	Date of completion of the search	Examiner			
MUNICH	2 October 2003	McGrath, S			
CATEGORY OF CITED DOCUMENTS					
X : particularly relevant if taken alone	T : theory or principle underlying the invention				
Y : particularly relevant if combined with another document of the same category	E : earlier patent document, but published on, or after the filing date				
A : technological background	D : document cited in the application				
O : non-written disclosure	L : document cited for other reasons				
P : intermediate document	& : member of the same patent family, corresponding document				

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 99 10 4176

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
 The members are as contained in the European Patent Office EDP file on
 The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-10-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
EP 0705036	A	03-04-1996	JP	8102922 A	16-04-1996
			CN	1130843 A ,B	11-09-1996
			DE	69525804 D1	18-04-2002
			DE	69525804 T2	24-10-2002
			EP	1158793 A2	28-11-2001
			EP	0705036 A2	03-04-1996
			US	5686954 A	11-11-1997
JP 09326993	A	16-12-1997	JP	3272243 B2	08-04-2002
JP 09247603	A	19-09-1997	JP	3233850 B2	04-12-2001
US 5543929	A	06-08-1996	AU	8085094 A	08-05-1995
			CA	2174554 A1	27-04-1995
			CN	1136379 A	20-11-1996
			EP	0727124 A1	21-08-1996
			JP	9507007 T	08-07-1997
			WO	9511567 A1	27-04-1995
			US	2003012555 A1	16-01-2003
			US	6463206 B1	08-10-2002
US 5488409	A	30-01-1996	AU	7874294 A	10-04-1995
			WO	9508822 A2	30-03-1995
			US	5581614 A	03-12-1996
			US	5621579 A	15-04-1997
			US	5724203 A	03-03-1998
			US	6091884 A	18-07-2000
			US	6487362 B1	26-11-2002
			US	2002012525 A1	31-01-2002
			US	6240241 B1	29-05-2001
			AU	6021394 A	15-08-1994
			CA	2153259 A1	21-07-1994
			CN	1119049 A	20-03-1996
			DE	69432673 D1	18-06-2003
			EP	0746851 A1	11-12-1996
			JP	3392867 B2	31-03-2003
			JP	8505729 T	18-06-1996
			SG	52697 A1	28-09-1998
			WO	9416441 A1	21-07-1994
			AU	670039 B2	04-07-1996
			AU	2540692 A	16-03-1993
			BR	9206393 A	20-06-1995
			CA	2115771 A1	04-03-1993
			EP	0600006 A1	08-06-1994
			HU	76499 A2	29-09-1997
			JP	6510154 T	10-11-1994

EPO FORM P0459
For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 99 10 4176

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

02-10-2003

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5488409	A		NO 940536 A WO 9304473 A2	19-04-1994 04-03-1993
JP 10042242	A	13-02-1998	BR 9705068 A CN 1174477 A ,B RU 2202859 C2 US 2002054063 A1 US 5909212 A	18-05-1999 25-02-1998 20-04-2003 09-05-2002 01-06-1999
US 5541738	A	30-07-1996	AU 2292195 A WO 9528056 A1 US 2003012555 A1 US 6463206 B1	30-10-1995 19-10-1995 16-01-2003 08-10-2002
WO 9749237	A	24-12-1997	AU 716998 B2 AU 3398997 A BR 9702300 A CA 2228391 A1 CN 1198285 A EP 0845188 A1 JP 11511942 T WO 9749237 A1 US 6078348 A	16-03-2000 07-01-1998 28-12-1999 24-12-1997 04-11-1998 03-06-1998 12-10-1999 24-12-1997 20-06-2000

EPO FORM P459

For more details about this annex: see Official Journal of the European Patent Office, No. 12/82

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.